AN INTERESTING REPAIR JOB (Illus.). *See p.* 173.
THE FUTURE OF THE INTERNAL COMBUSTION ENGINE. *See p.* 180.

SHIPBUILDING AND SHIPPING RECORD

A JOURNAL OF SHIPBUILDING, MARINE ENGINEERING, DOCKS, HARBOURS AND SHIPPING

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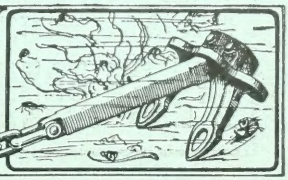

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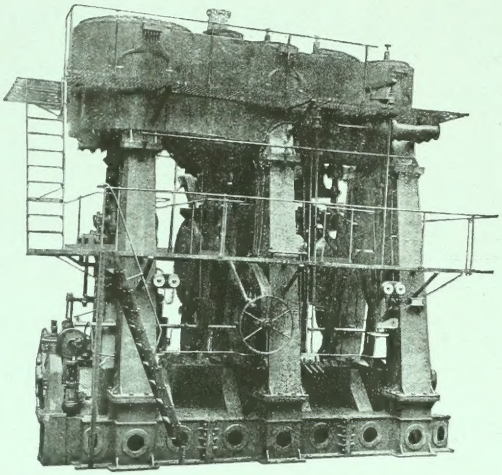

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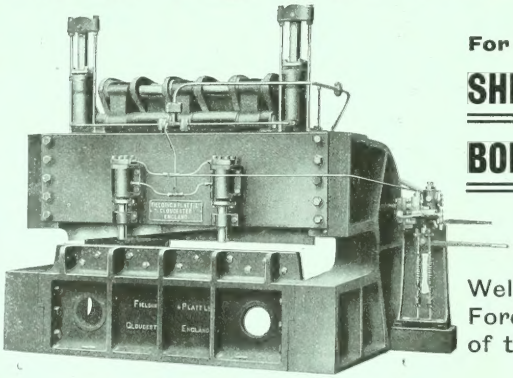

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VOL. XI.] THURSDAY, FEBRUARY 14, 1918. [No. 7.

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Shipping Policy.

SO wide has been the attention given to the trenchant criticism of the shipping policy of the Government in the report of the Liverpool Steam Ship Owners' Association, which we published last week, that it becomes incumbent on the Government to give some reply. A new session of Parliament has just begun, and it should offer an opportunity. What we may expect from the Government bench is a proclamation of departmental infallibility, an apology based on the doctrine that war is waste. Minor ministers in particular are wedded to the theory that the department can do no wrong. That in no way implies the hopelessness of debate. Anything that focuses intelligent views on a subject of public importance is useful, and parliamentarians are not unacquainted with the spectacle of a Government apparently unmoved by criticism, quietly modifying its line of action to escape the attention of the critics. Here in a closely argued authoritative report an indictment of certain aspects of the shipping policy of the Government is presented. The document bears the impress of one of the most independent, vigorous, and thoughtful minds at present given to the daily study of the operations of shipping. This report is distinguished not only by a clear command of the facts of a vital industry, but by their relation to the needs of the nation. If, indeed, it possesses a marked individualist bias, its general tenor harmonises with the growing tendency of the commercial classes to throw off the fetters of officialdom in the sphere of business management at the earliest possible moment. It would be most damaging to the Goverment to ignore it.

Insuring Freight on Requisitioned Steamers.

A difficulty in insurance matters which has been troubling the owners of requisitioned steamers for some time is the fact that there being no actual freight to insure, the cover available on the total loss basis has proved inadequate, owing to the limitations imposed by the 15 per cent. Disbursement Clause; the result being that requisitioned vessels are placed at a further disadvantage in comparison with free vessels. In order to equalise matters, underwriters have been asked to permit an insurance of 25 per cent. of the insured value to be placed on freight on a "policy proof of interest" basis, and we understand that this has been granted in some cases. The principle is a just one, and since no better scheme presents itself at the moment, the insurance market is right in permitting this technical infringement of the Disbursement Clause to pass. We understand that there is some dissatisfaction amongst underwriters at the concession which has been made, but it seems to us that as long as the departure from the strict limits of the clause is only undertaken in the spirit of fair usage, and no advantage is taken by the owner to snatch additional cover at total loss rates, there is no great harm done.

"Proxima Causa."

The settlement of the *Ikaria* appeal in the House of Lords, which was dealt with in these columns last week, would appear to bring a new factor in the application of the rule of *proxima causa*. This may be called the rule of continuity of peril, for it was undoubtedly on the fact that the *Ikaria* was in constant danger from the moment she was torpedoed that the appeal was settled. This gives an interesting light on another case which we have discussed before in this connection, where a steamer after being torpedoed, was badly damaged by collision with a vessel which was assisting her. Here, underwriters on the marine policy have settled a sum "on account," but taken in the light of the *Ikaria* judgment the collision damage should attach naturally to the war risk policies, and the underwriters on the marine policies should be refunded that which they have settled. There can be no question that the peril occasioned by the enemy torpedo continued up to the time of the collision, as the latter accident was occasioned directly by the former. Nor is it probable that negligence on the part of either vessel could be brought in as a cause of the damage, since the circumstances hardly permit any act, however rash in appearance, to be classified as negligent when the saving of life and property is the occasion of the action.

Blue-Book Rates.

Very soon, we hear, Sir Joseph Maclay and the Treasury are expected to arrive at a decision in regard to the advisability or otherwise of raising the rates now paid for requisitioned ships. Several months ago the question was taken up by the Chamber of Shipping with the Controller, who at once agreed that an inquiry should be held into the matter. Accordingly, he appointed an accountant and the Chamber another, and for some time they have been engaged in examining the accounts submitted by shipowners. Their report has already been considered by the Council of the Chamber of Shipping, and this document, along with a number of recommendations, have now been forwarded to Sir Joseph Maclay who, as an experienced shipowner himself, will readily appreciate the points raised, and who, it is known, is anxious that the matter should be settled without further delay, although, of course, everything depends upon the attitude of the Treasury. Unfortunately, however, the rates are not the only grievance which owners have. For instance, the authorities continue to repudiate liability for the damage sustained by ships

through the masters following out the official instructions given them, and they also decline to pay anything for the time the vessels are out of commission for the purpose of repair. It is urged that, if the Government refuses to increase the rate of hire, it should agree to the payment of compensation for the damage incurred when carrying out orders. There, however, appears to be a confident feeling that the situation will be ameliorated somehow.

The Submarine Menace.

From the point of view of the general public it is regrettable that prominent men draw so many different conclusions regarding the submarine menace from the same set of facts. The result is unquestionably unsteadiness where there should be steadiness of opinion. The truth probably is, however, that there is justification for both the optimism and the pessimism. The optimists are impressed by the fact that our defensive and offensive measures against the pirates are not only developing, but already showing gratifying results. The pessimists, whose latest adherent appears to be Lord Jellicoe, fear with a good deal of reason that every optimistic estimate of the position serves principally to slacken the public's support of the naval authorities in their difficult task. Our own opinion is that the evil will be got under before the date given by Lord Jellicoe. But we are not inclined to blame him for putting the end so far off, because the civilian population of these islands appears to be extremely slow to grasp the fact that a great deal depends upon it. It makes far too much of the inconvenience of limiting its consumption of food and the raw materials of industry, although it is quite clear that the fewer sea-borne cargoes there are to carry the less effective in a military sense will the U-boat warfare be. And it does not realise to the extent it should that the building of merchant ships is a vital factor. Decrease of consumption and increase of shipbuilding output are, indeed, parts of the military plan, and if Lord Jellicoe's speech at Hull induces the man in the street to regard them as such his pessimism will be fully justified.

Developing Export Trade.

In our issue of December 13 last, we drew attention to the organisation of a body of British manufacturers and producers under the title of the British Manufacturers' Corporation, for the purpose of developing export trade by the employment of "agents in charge" in all important foreign centres, who would work in the interests of the members of the corporation. This scheme, which is obviously of the greatest interest to shipowners, has met with a large measure of support from manufacturers all over the country, and this has led Sir Charles Mandleberg, the originator of the scheme, to issue a further draft of the proposals which have been developed further in one or two important directions. Thus, in order to keep the members of the corporation informed as to the possibilities of any particular branch of foreign trade, and subsequently to give practical information as to the best methods whereby this trade could be developed, it is proposed to open offices in the chief manufacturing centres in this country, with a small staff in each, the managers of which would be appointed mainly for their thorough knowledge of the technical details of export trade. Another proposal which will commend itself to members of the corporation, is the appointment of selling agents. These will be selected by the agent-in-chief on the spot, who will be in a position to appoint those men who are best suited to deal with the business involved. Furthermore, it is proposed to secure advantages for members in the direction of banking facilities, and while it is recognised that this matter is already being dealt with by the British Trade Corporation, it is hoped that the efforts of the new corporation would not be in any way antagonistic to those of the British Trade Corporation, but complementary thereto.

The Atlantic Conference.

Although no information concerning the working of the recently-formed conference of British and French steamship lines engaged in the North Atlantic trade has been issued since the official announcement of its establishment, we hear that the progress in the interval has been quite satisfactory, and that an understanding with other companies in the Allied countries has been reached. There appears to be a good deal of speculation in regard to the plans of Dutch and Scandinavian interests. At the moment, however, no action is possible. Holland cannot afford to fall out with Germany, whatever may happen when peace is concluded. Denmark geographically is, unfortunately, in a bad position, whilst Sweden is, rightly or wrongly, credited with a bias in favour of the Germans, probably, however, for no other reason than that their mutual trade relations are excellent. Naturally, one does not quarrel with good customers. On the whole, perhaps, Norway has maintained most independence, and we are given to understand that the Norwegian-American Line, for which the liner *Stavangerfjord* is now being built in this country, is not likely to join a Germanic combine. As regards Adriatic traffic, much, of course, will depend upon the outcome of hostilities, but an agreement has already been arrived at between the Hamburg-Amerika Line, the Norddeutscher Lloyd, the Austrian Lloyd and the "Adria" Company, in connection with the post-war trade of Trieste and Fiume, with which the Cunard Line and the Canadian Pacific Company had at one time regular communication.

Two Hamburg-Amerika Liners.

It has been decided on appeal that the Hamburg-Amerika liners *Kronprinzessin Cecilie* and *Prinz Adalbert* are for the present not to be subject to the full decree of condemnation as prizes of war. They are, however, to be held in provisional detention pending the end of the war and the final determination between this country and Germany as to the application of the Hague Convention relative to the status of enemy merchant ships in port at the outbreak of hostilities. On the outbreak of war between France and Germany these two vessels went into Falmouth no doubt to avoid the possibility of encountering French cruisers. They were in that port when shortly afterwards Britain declared war, and they were seized. Sir Samuel Evans condemned them as lawful prize, but the Judicial Committee of the Privy Council has modified his decision in the sense we have indicated. In this the precedent of the well-known *Chile* case has been followed. The British Government on the outbreak of war indicated its readiness to comply with the Hague Convention on a reciprocal basis, but no response was forthcoming from Berlin. Accordingly, it has been the policy of our Prize Court to suspend, as it were, final judgment in regard to German ships found in our ports on August 4, 1914. Their detention has been legally decreed, and it all depends on the arrangements respecting the Hague Convention whether the decree will become one of complete confiscation. Meantime these detained German ships are properly employed in the service of this country.

War and Marine Perils.

It does not follow that because a vessel has been claimed by the Germans to have been sunk by one of their submarines, the announcement can be accepted as irrefutable evidence of the loss by a war peril. Indeed the circumstances of the loss of the Spanish ship *Pelayo* conclusively show how eagerly Berlin has grasped at the mysterious disappearance of a vessel to inflate the record of ruthlessness of the U-boats. The *Pelayo* left the Tyne for Barcelona on November 17, 1916, and was never seen again. Mr. Justice Roche has just decided in the High Court that on a balance of the probabilities regarding the violent weather, the construction of the vessel and the ascertained situation of the moment respecting mines and submarines she was lost through the operation

of a marine peril. An award against the underwriters has been made on this basis to the owners, the Compania Maritima of Barcelona. The decision demonstrates that because a vessel disappears in the war region it is not invariably a war peril. Some time after the vessel was posted missing at Lloyd's the news of the event evidently filtered through to Germany. The German wireless immediately circulated the news that she had fallen a victim to the submarine. *Hansa* recorded the loss to swell its dubious and exaggerated statistics of U-boat activity. The Spanish Ambassador protested at Berlin only to receive the reply that the report of the destruction of the *Pelayo* by submarine rested on the authority of the report that she had been posted missing at Lloyd's. Thus the myth which had been conceived with a purpose faded away. Our Marine Insurance correspondent's comments will be found on page 181.

Deadweight Capacity.

Some time ago we discussed the question of the guarantee of a ship's deadweight capacity under a charter-party in relation to lifting capacity applied to a particular cargo. It arose in connection with the case of Wm. Miller & Company, Ltd., *v.* the Owners of the steamship *Freden*. Mr. Justice Rowlatt then held that the deadweight capacity mentioned in a charter-party meant a ship's lifting capacity in the abstract, unless the agreement between the parties stipulated a particular cargo. The Court of Appeal has just approved of this declaration of the law, which indeed has common sense behind it. Cases of this kind may indeed wear an aspect of secondary importance, but they are worth noting because in the quick routine of business such unforeseen points of controversy are apt to arise. In the particular case in question the charter-party contained the provision that "the owners guarantee the ship's deadweight capacity to be 3,200 tons, and freight to be paid on this quantity." The charterers supplied a cargo of maize, but the vessel was only able to accommodate 3,080 tons. There was no doubt at all that the vessel had a lifting capacity of 3,200 tons. The charterers, in seeking damages to compensate them for the smaller quantity carried, contended for a construction of the agreement as guaranteeing capacity to carry 3,200 tons of maize. This view the courts have rejected because no specific stipulation was made as to the carriage of maize.

A.S.E. and the Army.

As the ballot of the Amalgamated Society of Engineers on the Government's Man-Power proposals closed on Tuesday, it is possible that the result may be known by the time these lines appear in print. It is, therefore, to take a risk to speculate as to what Mr. Brownlie and his colleagues on the Executive Council may decide to do with regard to the invitation of the other trade unions to a conference at which no representative of the Government is present. Our inclination is to assume that they will decline the invitation, because, having turned the matter over to the Delegate Meeting, and the Delegate Meeting having turned it over to the branches, the whole business, including principles and details, is in the hands of the rank and file. Moreover, on the ballot paper as it was printed, the issue stated was not in reality whether there should, or should not, be a separate conference, but whether the attitude of the Executive Council, the Delegate Meeting and the so-called Representative Conference on the Government's proposal, themselves had, or had not, the approval of members. Assuming that the note is in the affirmative, the difference between the A.S.E. and the other trade unions is one which cannot be mutually adjusted. One side or the other must give way. "We cannot," says Mr. Robert Young of the A.S.E., "lightly assent to the skilled men being displaced by the lesser skilled men who have come into the trade since the commencement of the war. It is an attack on our trade. It is a misuse of dilution. It is contrary to all we have been repeatedly told about the value of skilled men in this war." The contention of the other unions being that all workers should be treated alike, the prospects of a compromise are obviously poor.

America's Shipbuilding Effort.

The past week has witnessed a stiffening of the effort of the United States in every department of her war activity, and since it is in the task of providing "ships and still more ships" that our great Ally is devoting a large amount of her energies, the question of shipbuilding has been very much to the fore. The debates in Congress have shown that the Administration is concerned solely with the means of making America's participation in the struggle more speedy and more effective, and the correspondent of *The Times* has sent a long cable dealing with the measures that have been and are being taken to accomplish this end. Declaring that "ships are the critical question," he states that the Shipping Board, after the waste of much valuable time, is now bending every effort to the building of new shipyards and the use of existing shipyards to the best advantage. Happily the response made to the appeal for workers in the shipyards is satisfactory. It is possible under favourable circumstances that the new steel ship construction in 1918 may exceed 2,500,000 tons. Seventy-four new yards have been built, and more than 700 slipways are now in operation, as against less than 150 ten months ago. A general installation of electric lighting so as to permit of the continuous operation of the shipyards under "three-shift plant" would substantially increase the above estimate, but the problem is largely one of labour.

Enemy Shipbuilding.

A week ago we gave an extract from a *Hansa* review of shipbuilding in 1917, which began with the words: "Naturally, no details can be given concerning the shipbuilding activities of the Central Powers." A correspondent writes to us to suggest that Herr Steinert, the writer of the review, might profitably employ a little of his leisure in telling his readers, and the world at large, why he is "naturally" silent about German shipbuilding activities. We know, of course, why he is silent about Austro-Hungarian activities. "In Austria-Hungary," says *Hansa's* contributor, "most of the yards are at a standstill, and new constructions do not nearly cover war losses." If the state of matters is different in Germany is there any sound reason for withholding information about it? Great Britain and her Allies in this war have convincing reasons for their reticence about merchant shipbuilding. The less they say, and allow to be said, about the output of new tonnage, the more our enemies are compelled to guess, and in mental exercises of that sort Berlin's strategical calculators are, as we know, rather dismal failures. On the other hand, if Berlin compiled a monthly shipbuilding return, had the figures vouched for by a neutral ambassador, and sent it out in its wireless service, no military interest of the Central Powers would suffer in the slightest degree. Enemy mercantile marines are playing very minor rôles in the war, and it is a matter of small concern to anybody outside of Germany whether their units are more or less numerous than they were in 1914.

The Standard Ships.

So far the authorities cannot flatter themselves that the standard ship scheme has been the success that was confidently predicted. It has frequently been pointed out that a greater rate of production would have been obtained had the builders accustomed to the construction of tramps been allowed to build as many of their particular type as they possibly could. A case in point may be cited. Certain builders had a capacity for the construction of abut 30 cargo ships per annum and guaranteed that such could be produced if they were allowed to proceed in their own way and build their own design of ship. Because, however, this design differed a little from the standard, this offer was not accepted, and what with the delays at the introduction of the standard scheme and those caused by the action of the authorities the output was materially reduced. There

may be some reasonable excuse for the multitude of alterations which take place when large warships are under construction, but it should surely be possible to do away with such vexatious things in the building of cargo tramps. Nothing delays the construction so much, and causes those in charge to lose interest in the vessels being built. The general impression amongst those engaged in the production of Government standard ships is that there is a lack of decision and judgment amongst those in authority, and that the most is not being made of the available means of production because of the retarding influence of red tape.

THE STATE AND SHIPPING.

IN a recent issue we pointed out that because the Government has no shipping or shipbuilding policy both of these industries were drifting towards a position for which nationalisation would be assumed by short-sighted politicians and other people to be the only cure. The State is using all ships for the purposes of the war, and slowly but surely getting into the mental habit of regarding its organisation of the business as suitable to normal conditions. And it has filled the shipyards—which are, of course, also under its control and being operated exclusively from the point of view of the great conflict's necessities—with vessels which are designed to fulfil war requirements without regard to economic or other considerations. The building of these ships is bound to go on for a considerable time after the end of the war. This is, in fact, the tonnage with which we shall begin our great post-war fight to regain the world's trade, and, with the inevitable continuation of the controls which are at present operative, the organisation will be that which we have indicated. Readers are in no need to be told that these are almost exactly the circumstances in which political clamour for nationalisation is likely to thrive.

Politicians have no memories and ordinary members of the public very poor ones. But at this stage of the evolution which appears to be in progress the point may not unprofitably be made that if in the years prior to 1914 British shipping had been a State-owned and State-operated industry the sea power which is enabling the Allies to win the war would have been lacking.

"The mercantile marine," Mr. Paterson Purdie, president of the Clyde Steamship Owners' Association, said the other day, "built up solely by private interest and public investment, was one of our national saviours when this great war was suddenly thrust upon us, and the finest and latest types of merchant ships were immediately available and utilised as auxiliaries."

"The possession of a mercantile marine, capable of carrying one-half of the oversea trade of the world, has alone enabled the war to be fought," says the Liverpool Steam Ship Owners' Association in its annual report, "and that service was built up out of the capital of individuals and by the energy and enterprise of individuals."

These are statements of fact, as everybody, whose knowledge of shipping affairs is intimate, knows, and as most politicians and other public men would soon realise if they devoted a little of their leisure to the study of industrial history.

We might make the point that in view of these facts British shipowners deserve far better treatment than the State has, so far, meted out to them. We are at the moment, however, more particularly concerned to show that if the Government and the politicians who form it and support it are wise they will resist the clamour for nationalisation which must inevitably arise, and as quickly as possible get both the shipping and the shipbuilding industries back on to the lines of development which gave so good results from every point of view in pre-war days. The pure principle of nationalisation is obviously inapplicable to either industry. The kind of nationalisation towards which we are drifting would be the ruin of our trade.

"Important as has been the part played by British shipping in the conduct of the war," says the Liverpool Steam Ship Owners' Association, "the part it will have to play in getting the nation back to industry and commerce must be equally important. The foreign trade of the country will be crippled until the British mercantile marine is brought back to at least its old state of efficiency."

According to Mr. Paterson Purdie, shipping constitutes the veritable foundation and fabric upon which our commerce, manufactures, and trading exist, and was developed and expanded throughout the world so that the entire community was individually affected by its prosperity or adversity—its successful operation, its maintenance and its expansion. In these circumstances it behoves the Government, in the opinion of the president of the Clyde Steamship Owners' Association, to do everything that is possible to assist and encourage the shipping trade to resuscitate the mercantile marine on strict commercial lines.

We are in full agreement with these views, and so, we imagine, is everybody who has gone into the facts. The avowed aim of most advocates of nationalisation is to "protect the consumer." The growth of British trade in pre-war days suggests that neither producer nor consumer was in much need of protection from the shipowner in normal times. Since the outbreak of war wholesale charges of profiteering have been laid against the shipowner. Yet with shipping completely under State control, prices are not less, but more, than they were, and supplies are a good deal shorter. The truth is that a large part of British shipping's pre-war success was due to the care with which it studied the requirements of consumers. The industry has, we submit, convincingly established its right to fair play and freedom.

SHAPE OF SHIPS' SECTIONS.

IN an editorial article on "The Longitudinal Distribution of Displacement," in our issue of December 20 last, we referred to the fact that from recent experimental investigation it might be gathered that a vessel could be given almost any shape of section without materially affecting the resistance. It was further pointed out that the predominating factor was the shape of the sectional area curve, and that Froude's finding that "the resistance of a form is almost determined solely by the curve of cross-section areas, together with the extreme beam and the surface water-line of the fore body," receives ample justification. Unfortunately—through an error on the printer's part—the article proceeded to say that the accepted practice is to have sections approaching the V-shape forward and U-shape aft. Needless to say this ought to have read *U-shape forward and V-shape aft.* Now, this is not a rule which must be followed blindly, as there is quite a latitude in which a designer may work without bringing about abnormal resistance, and also the particular speed-length ratio at which the vessel is intended to run allows of a departure from this rule.

Some years ago, the form of a fast cross-Channel steamer was under consideration. In a vessel of the same class, built in the particular yard in which the new ship was to be constituted, the U-shaped sections forward and V-shaped aft had been followed closely. This cross-Channel steamer did very well on trial and in service, and an attempt was made to keep as close as possible to her form. Much greater accommodation was required, however, in the new ship at the forward end, and it was found that the U-shaped sections did not allow of this accommodation being sufficient. With some reluctance the U-shaped sections were departed from and they were filled out above and fined below, giving much more room in the passenger space. Subsequent experiment showed that the new form was quite as good as the old. The speed-length ratio in this case was about 1·2. The general character of this second design was followed in succeeding ships with success and the body plan of the cross-Channel steamer given in *Shipbuilding & Shipping Record*, Vol. VIII, page 233, shows the same characteristics of form.

The particular type of ship in which it is most important to follow

the U-shaped forward section idea is in high-speed vessels of the *Mauretania* type. Any one who has had the opportunity of viewing the great Cunarders close at hand, especially in dry dock, must have been struck with the close adherence to the U-shape forward. In these ships, with a length of 765 ft. and a speed of 25 knots, the speed-length ratio equals about ·93. The coefficient of fineness is in the region of ·6 and the resistance, one might conclude from the exhaustive investigations made on their form before construction, must be near the minimum.

When fuller types of ships are considered the U-shaped forms forward are still desirable. In McEntee's recent paper on "Cargo Ship Lines of Simple Form," read before the American Society of Naval Architects and Marine Engineers (see *Shipbuilding & Shipping Record*, December 13, 1917) the shape of the forward sections showed an adherence to this. The after sections may be modified in shape as desired, but round or V-shaped forward sections in full ships are to be avoided. The important point to watch in cargo ship design is to have a very easy run, which may necessitate the centre of buoyancy being well forward, but this is no objection —at least from the resistance point of view.

In very high-speed craft, such as destroyers, the adoption of U-shaped sections forward is optional and they may approach the V-shape without material influence or resistance.

On the other hand, when the designs of barges and light-draught river boats to ply in shallow waters are being considered the sections forward should be round, with spoon-shaped buttock lines. In one particular case which came within the writer's notice the design had been made out by one who believed in U-shaped sections and hollow waterlines forward, irrespective of the peculiar conditions of draught of vessel, depth of water, and speed, under which the vessel was to run. The result was high resistance and a large wave disturbance. Another vessel for the same trade was afterwards built by well-known experts which attained the same speed with half the horse-power, and the vessel moved along with a minimum of disturbance. This was due to the adoption of easy spoon-shaped buttocks and round forward sections.

From the available data to hand it is evident that no fixed rule can be given as to type of section and type of sectional area curve which will ensure the minimum of resistance in every class of ship. The conditions vary in almost every case, and it is only by experimental investigation that the peculiar form will be found which best meets the special case. Fortunately the leading experimenters are constantly adding to our knowledge and the pitfalls which await unwary designers are being discovered and brought to light.

MOTOR DRIVEN AUXILIARY VESSELS.

ONE of the direct effects of the war on the shipbuilding industry has been the revival of the auxiliary vessel, that is, the vessel which carries sails, and in addition an engine of small power. It was not until 1914 that the possibilities of the big trading auxiliary were realised either by shipowners or by manufacturers, but since that time, so much success has been attained that an American writer has been led to question whether, for vessels carrying less than 3,500 tons, the auxiliary will not supplant both the steamer and the full-powered motor-ship on many important trading routes.

It is in America that the development of this class of vessel has been most marked, and two main reasons may be held responsible for this development. The first is the need for rapid construction, and the second is the difficulty of obtaining steel. These conditions will doubtless persist during the whole period of the war and for a considerable time after, and thus it would appear as though this type of vessel is likely to retain its favour with shipbuilders and owners of coasting services, at least as far as America is concerned. Especially upon the Pacific coast has this auxiliary vessel developed, due principally to the fact that steel could only be obtained at extremely high prices, whilst there was an abundant supply of timber suited for constructional work available at comparatively low cost. The result has been the starting of a new industry, and the wooden ship of between 2,000 and 3,000 tons deadweight capacity, fitted with engines of about 500 h.p., capable of propelling the vessel at about 6 knots is now regarded as an advantageous proposition. The oil engine is almost exclusively used on vessels of this class.

The most popular type of auxiliary vessel in America is a vessel of deadweight capacity of about 2,400 tons, exclusive of bunker oil, the length overall being 250 ft., the beam 43 ft. and a gross tonnage of approximately 1,600. Two 240 b.h.p. oil engines are installed, running at 250 to 300 revolutions per minute, thus allowing a reasonable propeller to be used with a diameter of about 5 ft. 6 in. The type of engine generally considered to be the best adapted for the propulsion of auxiliary vessels is the hot-bulb or semi-Diesel type, using crude oil, of which many different makes are available, the most popular being imported from Scandinavia, chiefly of the Bolinder and Skandia designs. So great, however, is the demand for engines of this class that many American firms are taking up the manufacture of Scandinavian types under licence, whilst others are developing a type of engine of their own, such as the two-stroke Harris and the four-stroke Winton. These engines are all designed to give the vessel a speed of about 6½ knots under power alone, with a fuel consumption of well under 30 gallons an hour, and as suitable oil can be obtained at most ports on the Pacific coast of America at about 2d. a gallon, the fuel costs are obviously very low. In this connection some interesting figures are quoted by a contributor in a recent number of *The Times* Engineering Supplement, relative to an auxiliary vessel trading between Portland, U.S.A., and Sydney, Australia. During a complete year the ship made three round voyages, was 292 days at sea, and carried 16,900 tons of cargo. The total fuel cost for the whole year was £2,300, out of a total expenditure for the year of £25,000, while the freight earned was £46,000.

The wooden ship has not, however, fulfilled the anticipations of those who so strenuously advocated it a year or so ago, owing to the adoption of green pine rather than oak, such as was used in wooden vessels in earlier times, and also on account of the lack of skilled labour for the construction of the hulls. It is likely therefore that, despite the shortage of steel, the auxiliary vessel of the future, if it survives the return to normal conditions, will have a steel hull. Two good examples of the steel auxiliary may be mentioned. These vessels are to be built for the Aluminium Company of America. They will be of 3,500 tons deadweight, with a draught of 16 ft., the length over all being 350 ft. The machinery consists of two Harris-Diesel engines to each, and the vessels will be rigged as six-masted schooners.

That this large motor-driven auxiliary vessel is meeting with a considerable amount of success in America is shown by the fact that between 30 and 40 of these vessels have been completed, with an average deadweight carrying capacity of between 2,500 and 3,000 tons and that quite double the number are now on order, and will no doubt be completed during the year. But other countries, especially the Scandinavian countries, are also developing vessels of this type; thus, in Denmark, where shipbuilders have hitherto mainly confined themselves to auxiliary vessels of under 1,000 tons deadweight, about a dozen such vessels have been ordered with a deadweight capacity of 2,100 tons.

It is interesting to speculate as to whether the development of this type of craft will have any influence on shipbuilding in this country after the war. That we should be likely to build wooden auxiliary vessels can be dismissed at once, as consequent upon the enormous amount of steel produced at home during the war, it is almost certain that plentiful supplies of steel will be available when the demands for war purposes have been satisfied. The development of the medium-powered oil engine is not being neglected, and we have already drawn attention to the Kromhout engine of 320 h.p. built in this country. But the relatively slow speed of the auxiliary vessel when compared with the ordinary tramp

steamer is an obvious disadvantage to the former class of ship, and judging by the almost complete absence of the auxiliary vessel from our home coasting trade, it would appear as if, despite the undoubted economy possessed by these vessels, British shipbuilders and shipowners have a deep-rooted preference for the cargo vessel without sails.

PUBLICATIONS RECEIVED.

[A short notice of any publication does not necessarily preclude the subsequent appearance of a longer review.]

Efficiency Methods. An introduction to Scientific Management. By M. McKillop, M.A., and A. D. McKillop, B.Sc. (Eng.), C.E. London: George Routledge & Sons, Ltd., Broadway House, 68-74. Carter Lane, E.C.4. 215 pages + 6 illustrations. 5 in. × 7¼ in. × ¾ in. Price, 4s. 6d. net.

Text Book of Naval Aeronautics. By Henry Woodhouse, Member of the Board of Governors of the Aero Club of America. With introduction by Rear-Admiral Bradley A. Fiske, President of the U.S. Naval Institute. London: T. Werner Laurie, Ltd., 8, Essex Street, Strand, W.C.2. 288 pages with about 300 illustrations. Large quarto, 9 in. × 12 in. × 1½ in. Price, 35s. net.

In the publication of literature relatively to the war America has one great advantage over the other Allies, inasmuch as for nearly three years as a neutral country she had access to the publications of both groups of belligerents. This is reflected in the book now before us. Although written since the entry of the United States on the side of the Allies, it bears witness to the period of neutrality, and hence we find an impartial observation of the developments in naval aircraft by every one of the powers involved. The result is a wealth of knowledge of enemy aircraft and the methods adopted by him in training and developing this arm, which has, as far as possible, been carefully and laboriously hidden from the eyes of the people in this country.

It must not be thought, however, that this is merely a popular description of the development of naval aeronautics during the war. While the war has resulted in an immeasurably great development in the application of flying in the service of naval warfare, both offensive and defensive, it is realised by most thoughtful men that the aeroplane and the dirigible are destined to play a permanent and probably a predominant part in the schemes of national defence in the future, and it is to assist us in the preparation for this phase that this book will be of value, and its scope is sufficiently comprehensive to include much that will prove of value to the naval architect, the aero architect, and the engineer who will be associated together in the production of naval aircraft, as well as the pilots and the mechanics who will be responsible for flying them. In addition there is the class of men, the strategists, who by their knowledge and foresight must be capable of realising the importance of this new arm and of developing its possibilities to the utmost extent. These, too, will find much of value in the book. It was the Right Hon. Arthur J. Balfour who said, "The time is here, when command of the sea will be of no value to Great Britain without corresponding command of the air," and it is towards the achievement and to keeping the command of the air that all our energies must be directed.

The study of naval aeronautics has a more immediate end, however. Admiral Fiske, of the U.S. Navy, in the introduction to this work writes: "The greatest danger confronting the Allies is the German submarine. For combating the submarine, which was the most modern weapon when the war began, no weapon yet used has been thoroughly effective, with the result that the danger has increased and is still increasing. The most effective weapon has been one more modern than the submarine—the aircraft. . . . It is essential that a great number of young men be instructed as soon as possible in caring for and operating all kinds of aircraft and aeronautical machinery. To start this urgent work the most immediate agency is a book like this."

There are no fewer than thirty-seven chapters, many of which are of exceptional interest to designers and builders. Thus mention may be made of a chapter on "Aeronautics in relation to Naval Architecture," contributed by Naval Constructor H. C. Richardson, U.S.N., and of "The Evolution of the Aero Motor," which will be found of exceptional value to engineers who may find themselves unexpectedly called upon to design engines of this class. The chapters giving specifications of various types of seaplanes and dirigibles will be of great value to inventors and designers—this wide field, and the fact that the authors are able to deal with enemy as well as allied and neutral machines, gives an added value to all parts of the book. The subject of "Experimental Research" is also dealt with in a comprehensive manner, and the many directions in which experimental research is still essential to further progress are thereby suggested to the investigator.

The book is artistically produced, having been printed on art paper throughout; it contains many photographs, some of them taken from aircraft being of the greatest interest, while the drawings are very clearly reproduced. A comprehensive index at the end will considerably facilitate reference to the many different items treated in the text. As a guide to the important subject of Naval Aeronautics this is certainly the most comprehensive work we have seen, and it should be in the hands of all those who have been called upon to assist in the production and utilisation of aircraft. It is of interest to note that a companion volume on Military Aeronautics is to follow.

MANNING NORWEGIAN VESSELS.

The principal recommendations in a Bill for statutory control of the crew to be carried by Norwegian vessels relate to the number of mates, seamen, engineers and stokers, cooks and stewards, &c., to be carried by vessels of various types and tonnage. On steamships and motor ships one mate is to be carried by vessels of from 25 to 300 gross tons register; two from 300 to 2,000 gross tons; and three for over 2,000 tons (1,500 tons on tropical routes). Special provisions would be made for passenger vessels. Sailing vessels in oversea service would carry one mate for 25 to 200 net tons register, and two above 200 tons.

The deck crew would be in accordance with the following table:—

Steam or Motor Ships.			Sailing Vessels.			
Gross tons.	A.B's.	Men	Net tons.	A.B's	Men.	Boys.
200-350	2	2	200-300 ...	1	2	1
350-700	3	2	300-600 ...	2	2	1
700-1,000... ...	3	3	600-700 ...	2	3	1
1,000-2,000... ...	4	3	700-800 ...	3	3	1
2,000-3,000... ...	4	4	800-900 ...	3	3	1
3,000-4,000... ...	5	4	900-1,000 ...	3	4	2
4,000-5,000... ...	5	5	1,000-1,200 ...	4	4	2
5,000-6,000... ...	6	5	1,200-1,350 ...	4	5	2
6,000-7,000... ...	6	6	1,350-1,500 ...	5	5	2
			1,500-1,650 ...	5	5	3
			1,650-1,800 ...	5	6	3
			1,800-2,000 ...	6	6	3

In the case of steam and motor ships, one A.B. and one man would be allowed for each 1,000 tons above 7,000 tons; at least half the total must be A.Bs. and in case of odd numbers the odd man must be an A.B. Two boys may be substituted for one man. On passenger ships the deck crew must be at least 15 per cent. greater and have at least one extra A.B. On sailing vessels at least one man extra must be carried for each additional 2,000 tons.

Vessels with engines of 75 h.p. or over must carry two engineers unless the power is below 300 i.h.p. and the voyage occupies not more than 22 hours when one engineer will suffice. Three engineers must be carried for 1,000 i.h.p. or over, and vessels running through the tropics must carry so many engineers (irrespective of horse-power) that at least three watches can be arranged. For each 3 to 5 tons daily coal consumption (3 tons in the tropics) at least one stoker must be carried. For the rest, the number of stokers is determined by the number of furnaces, and the number of trimmers by the coal consumption. A donkey-man is to be provided on vessels engined above 1,000 h.p.; on small vessels which need carry only three engineers, one of these may be enrolled also as stoker and donkeyman.

The galley staff is determined by the number of other members of the crew. Steam and motor ships with 5 to 10 men must carry one qualified cook; with 11 to 15 men, a steward and a boy; with 16 to 24 men, a steward and a cook; with more than 24 men, a steward, a cook and a boy. Sailing vessels in oversea service must carry for 5 to 14 men, one steward; 14 to 20 men, one steward and one boy; 20 to 25 men, one steward and one cook; over 25 men, a steward, a cook and a boy. If there is no special cook, his duties fall on the steward.

GERMAN SHIPPING BANKS.

Hamburger Nachrichten denies rumours which have been circulated to the effect that the German Government proposed to establish a central shipping bank in Berlin and was therefore opposed to the schemes for establishing shipping banks in various centres of oversea and inland shipping activity. There is, it is said, no truth in such rumours. The Government does not propose to establish any central institution, but, on the contrary, recognises the desirability of having a limited number of banks in different parts of the Empire, just as is desired by those directly concerned with shipping. The governments of the various States concerned are to be left full power to deal with individual schemes which may be laid before them concerning the establishment of shipping banks.

The scheme for a shipping bank in Hamburg, with a capital of £490,000, is far advanced, and only awaits final acceptance by the authorities. The conditions of loans will be adapted to the present abnormal value of tonnage. Annual partial redemption is provided for ship mortgages, and it is specially important to note that a personal credit is arranged over and above the stringent mortgage requirements. The acceptor of a loan must offer complete security for the judicious management of shipping business conducted with the mortgaged vessel.

According to the *Norddeutsche Allgemeine Zeitung*, the statutes of the shipping bank to be established in Berlin are already lodged with the authorities for approval. It will be some months before the institution commences work, and its activities will necessarily be small at first. The Dresden Bank, the National Bank for Germany, and the Berlin Handels Gesellschaft are participating in the establishment of the new concern, which will take the form of a limited liability company. Funds for loan purposes will be obtained by issuing mortgage deeds bearing a higher rate of interest than war loan; owing to the high interest, it is expected that public subscriptions will be obtained readily. No animosity to the ship-loan bank is anticipated from the mortgage banks. The Berlin shipping bank will be concerned principally with coastal and inland shipping interests and will be quite independent of the Hamburg shipping bank.

BOYCOTT OF GERMANS BY SEAMEN.—At a meeting of the Merchant Seamen's League at Wandsworth on February 9, a resolution was passed in favour of boycotting all goods of German origin for two years after the war, and also declaring "that all master mariners shall refuse to salute or recognise the German flag on the high seas, one month to be added to the period of boycott for every additional rime." Commander Sir Edward Nicholl, in moving the resolution, said that German goods were still coming into this country through American and neutral ports. Captain Tupper, who seconded the resolution, said that the gentleman who was now outraging all the laws of humanity and civilisation would be in this country after the war, but he would be dressed differently; not as an assassin, but as a commercial trader. They must watch him and scotch him. The merchant service, from the officers down to the cabin boys, had pledged themselves that they would not salute the German flag in any port abroad.

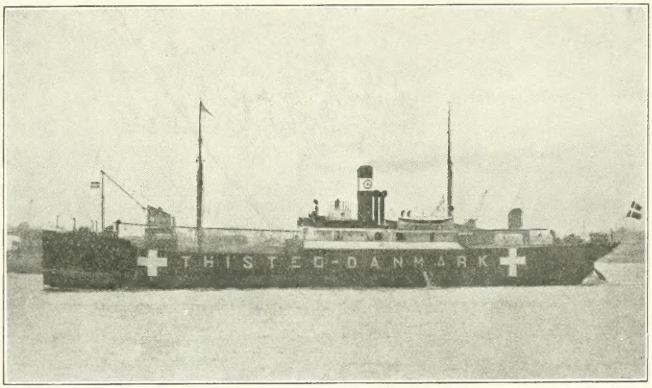
SS. "THISTED."

The ss. *Thisted*, built for the Nord-Ostersö Rederies, Copenhagen, by de Haan & Orelmans, Heusden, has just run successful trials in the new waterway. The principal dimensions are as follows:—

Length, b.p.	215 ft. 0 in.
,, o.a.	226 ft. 9 in.
Breadth, on frame	34 ft. 4 in.
Depth, moulded	15 ft. 6 in.
Gross tonnage	1,016·47 tons.
Net tonnage	577·94 tons.
Deadweight capacity	1,580 tons.
Speed on trial	9¼ miles per hour.

The vessel has a single screw to which is coupled a triple-expansion engine of about 500 i.h.p., and having cylinders 15 in., 25 in., and 40 in. by 27 in. stroke. The engines were constructed by Mr. C. A. Kuypers, Rotterdam. Steam is supplied from two cylindrical marine boilers, each having 1,800 sq. ft. of heating surface, the working pressure being 180 lb. per sq. in.

There are two main holds, one forward and one aft, two hatches are provided for working cargo in and out of the fore hold, but there is only one large hatch to the after hold. There are thus two cargo winches at the foot of the forward mast and one at the foot of the after mast. In addition there is a cargo winch on the poop deck, all the winches being of the same size, and having cylinders 6 in. by 10 in. The windlass on the forecastle deck also has cylinders 6 in. by 10 in. The officers' quarters are placed amidships on the bridge deck, and the crew are berthed forward in the forecastle, the poop being used as a cargo hold.



SS. "Thisted." 1,016 Tons Gross.

The following tables give the capacities of the various holds, tanks and bunkers:—

HOLD CAPACITY.

	Grain.	Bales.
Fore hold	43,100	40,000 cub. ft.
After hold	27,000	24,100 ,,
Poop	1,400	1,150 ,,
Total, including hatches	71,500	65,250 ,,

2 fresh water tanks, total capacity 8 tons.

WATER BALLAST.

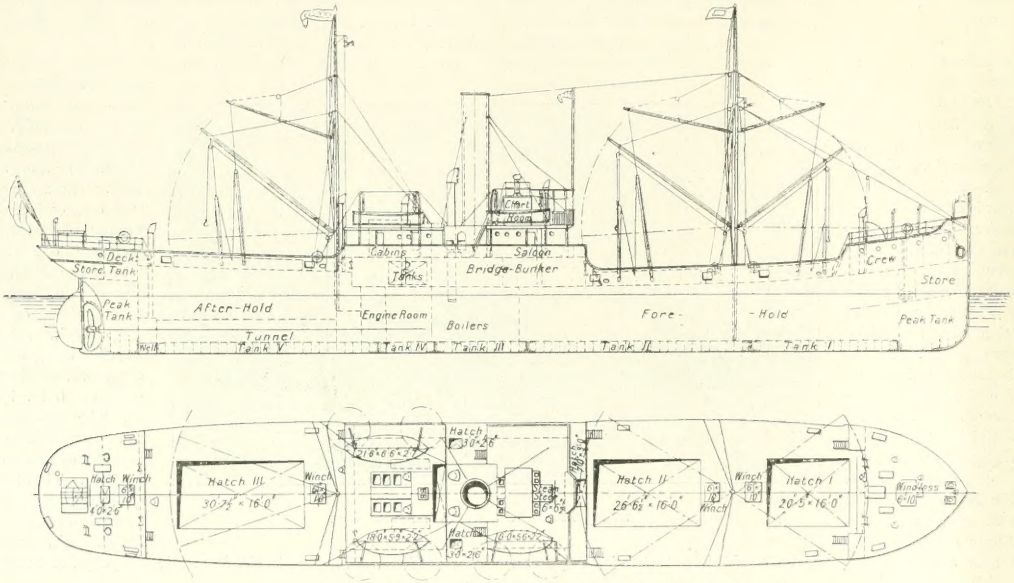
	Tons.
Fore peak tank	51
After peak tank	30
Bottom tank I.	55
,, ,, II.	126
,, ,, III. 2 × 25·5	51
,, ,, IV. 2 × 14·0	28
,, ,, V.	74
Poop deck tank	40
Total, about	455

BUNKER CAPACITY.

	Tons.
Under deck bunker	75
Bridge bunker	209
Bunker hatches	3
Total, about	287 tons of 45 cub. ft. each.

STANDARDISATION IN SHIPBUILDING.

In the reports of the Departmental Committees on After-War Trade, as given in the *Board of Trade Journal*, the following text bears on standardisation with regard to shipbuilding :—The principle of standardisation is approved by the Committees, and their reports show that effective standardisation cannot be achieved without the closest co-operation among manufacturers. The report of the Shipping and Shipbuilding Industries Committee was submitted before the Government decided upon the construction of standard ships, some of which are by this time upon the seas, and it must be understood that the "standard ships" of the present are being built to meet a war situation, while the standard ships of peace commerce will, in all probability, be built to satisfy entirely different requirements. As an example, the suitability of a vessel for the particular trade in which it is to be used is to-day subordinate to the rapid completion of the largest possible amount of tonnage.



Profile and Deck Plan, SS. "Thisted." (*See page* 171.)

form of a guidance specification, and is being drawn up under the auspices of the North-East Coast Institution of Engineers and Shipbuilders.

"In any type of engine such as is adopted for the plain cargo boat, where the general design is similar, differences being chiefly of detail, the universal use of such a specification should tend to an increase and cheapening of production. In the case of turbines and oil engines, where design is still in the early stages of development, standardisation is more difficult, but should be attempted."

In their recommendation the Committees make the following statement :—

"We view any movement towards standardisation with satisfaction, and are of opinion that further effort should be made to secure progressive standardisation in all directions. We are aware of the very valuable work which has been done by the Engineering Standards Committee for the benefit of shipbuilding and marine engineering, in which work shipbuilders and engineers have taken a large part, and we therefore recommend that the Government suggest to shipowners, shipbuilders, and marine engineers the desirability of forming a joint committee under the Engineering Standards Committee to consider these proposals.

"Shipbuilders and marine engineers who gave evidence before us, considered that the question of increased standardisation of production depended largely upon shipowners and their marine superintendents, and that it had not hitherto been practicable to carry it so far as it could have been, had shipowners and their technical advisers been prepared to forego insistence on their own ideas in general design and details. It is for this reason that we recommend that shipowners (or their representatives) be joined with shipbuilders and marine engineers on the above Standards Committee. We recognise, however, that, even so far as cargo carrying vessels are concerned, the extent of standardisation as to dimensions and general design must necessarily be limited in ordinary peace times by difference of the draught of water at various ports, variations in the methods of loading and discharging cargo, the nature of the cargo itself, speed requirements, &c."

SHIPS AND MARINE ENGINES.

The Committee's view on the subject of ships and marine engines is as follows :—

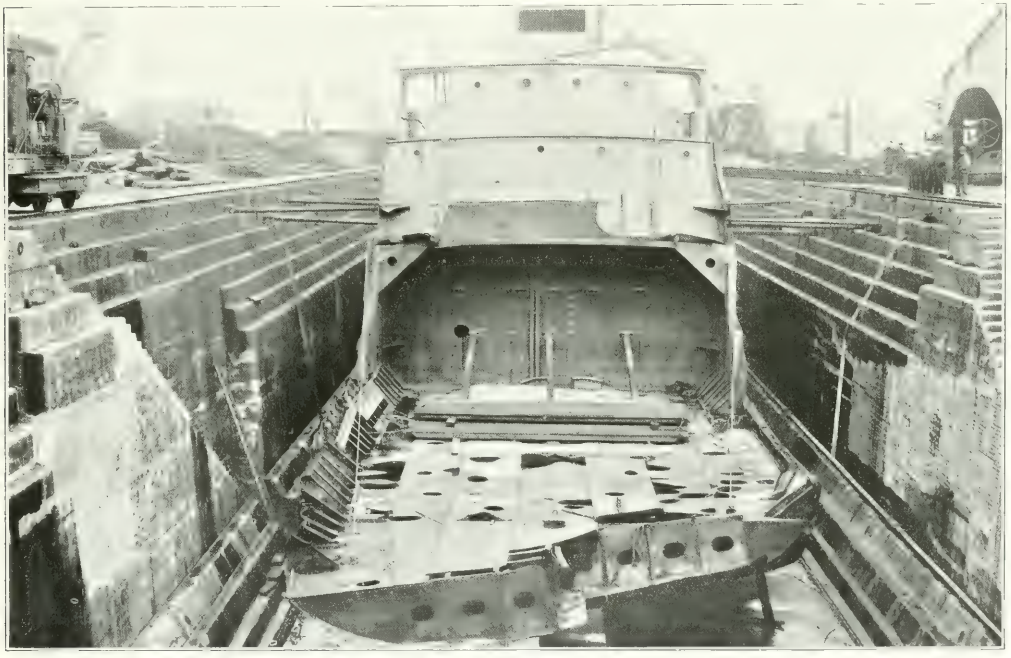
"Standard vessels and standard engines have been designed, and are being built by a large number of firms ; and the experience gained so far indicates that, under normal conditions, successful results might be achieved on similar lines. It should, however, be borne in mind that after the war efforts at increased standardisation will rest with individual builders and not with the Government. Standardisation had been carried to considerable lengths before the war in details of outfit, and even to the extent of building complete standard designed vessels. Generally, however, standardisation had been carried out works by works, and naturally in ordinary cargo boats alone.

"As in the case of the hulls of cargo vessels, so with marine engines, a considerable amount of standardisation has been effected within the works of individual firms building marine engines, and we learn from the evidence of one of the witnesses that an effort is being made to further standardise marine engines of the reciprocating type for cargo vessels. This standardisation has taken the

AN INTERESTING REPAIR JOB.

An interesting repair job was carried out recently by John Readhead & Sons, Ltd., South Shields. It illustrates how expeditiously repairs can be carried out by the co-operation of the ship repairers and the builders of a sister ship which was on the stocks in the course of construction. Briefly, the facts are as follow. A new vessel, belonging to Stephenson, Clarke & Co., London, was mined and eventually beached off Hartlepool, being badly damaged, and whilst on the beach she encountered very heavy weather. In order to salve her, it was decided to blow off a portion of the fore end considerably abaft the collision bulkhead, and tow the remainder to port. This was carried out, but owing to heavy weather the bulkhead between Nos. 1 and 2 holds collapsed, and eventually the sides forward of bridge fell in on to tank top.

The remaining portion containing the engines and boilers was, however, salved. It was decided to temporarily repair the salved portion and remove and land the loose damaged parts. This was duly carried out and temporary repairs were effected and the bulkhead shored and stayed to tank top. The salved portion was successfully towed by four tugs to the yard of John Readhead & Sons, Ltd., South Shields, and placed in their No. 1 dry dock. The photograph on this page, and on page 174, taken from three different positions, show how the vessel appeared in dock on August 27, 1917. Arrangements were immediately made with Wood, Skinner & Co., Ltd., Bill Quay, Newcastle-on-Tyne, builders of the vessel, to supply the required parts for damaged portion. This they did by taking down the forward end of a sister ship which they had under construction at the time, and which was completely framed and placed, but not riveted. This was carried out expeditiously by the above firm, the new parts being conveyed by lighter to the works of John Readhead & Sons, Ltd. The work of reconstruction was then proceeded with. The vessel having been under water, the whole of the accommodation throughout had to be renewed, together with all deck fittings. The time in dry dock occupied only 12 weeks. The photographs on pages 175 and 176 illustrate the progress of the work at the various dates given, the vessel being ready for sea again by November 7. Altogether the total length of the new fore end was 112 ft., and in addition to the above the vessel had extensive bottom damage. It is believed that this is a record for repairs. The repairs were carried out under the supervision of Mr. D. C. Rankin, representing the owners, and T. H. Wait & Co., St. Nicholas Chambers, Newcastle-on-Tyne, representing the underwriters.

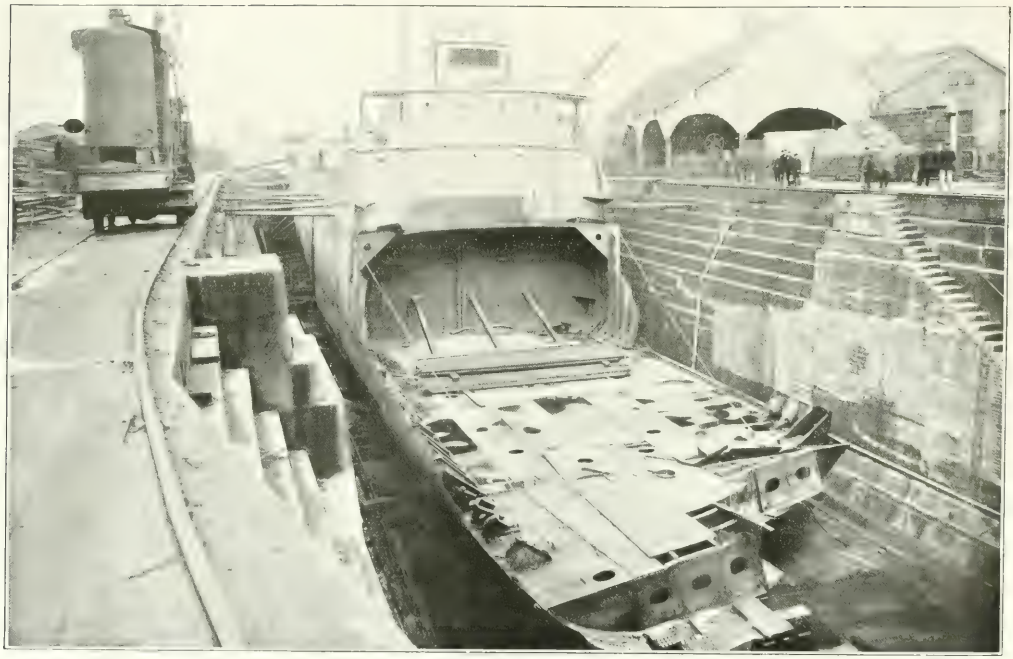


An Interesting Repair Job: View Showing Vessel End On. August 27, 1917.

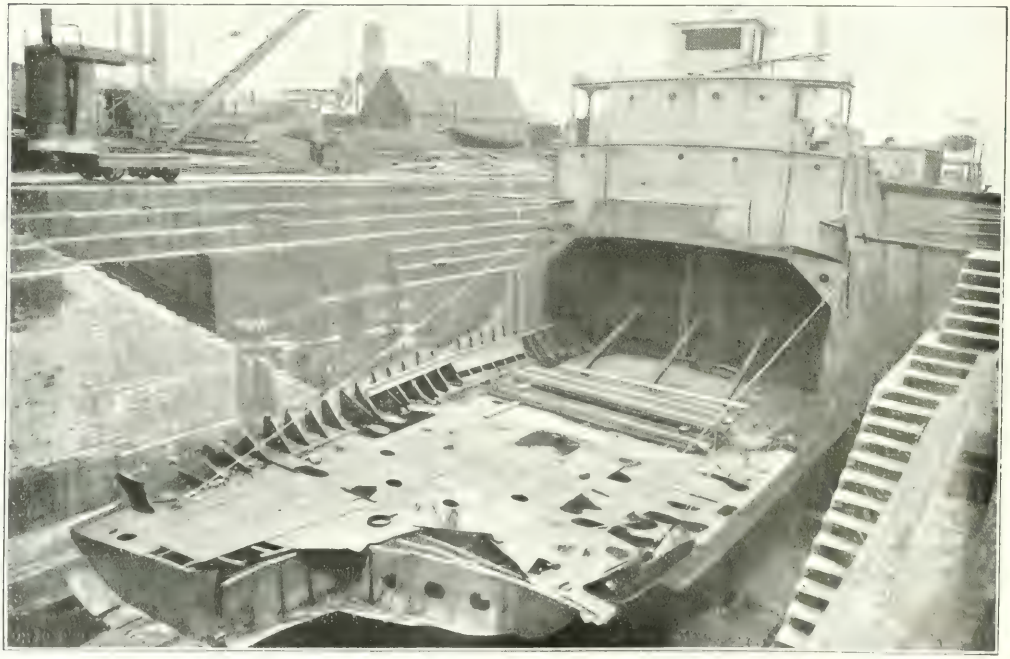
THE FUTURE OF SUBMARINE SOUND SIGNALS.

Writing in *Hansa*, Captain O. H. Wentzel emphasises the importance of conserving by every possible means such tonnage as may still be available after the war. Fog is one of the most prolific causes of loss in normal times, and submarine sound signalling, which had begun to show its possibilities before the war, has since been perfected in apparatus and technique to such an extent as to "meet all requirements" in the way of navigation in fog—whether at sea, in estuaries, or off dangerous coasts. It is possible, says the writer, to hear signals without special receiving apparatus, but for best results the latter should be provided. Signals can then be transmitted directly to the navigating officer. In order to realise the full possibilities of such signalling, all vessels must be equipped on a uniform plan, sending apparatus must be installed at all lighthouses, lightships and coast stations, and the whole service must be operated on an international basis. The matter is certainly one of great importance to shipowners and underwriters.

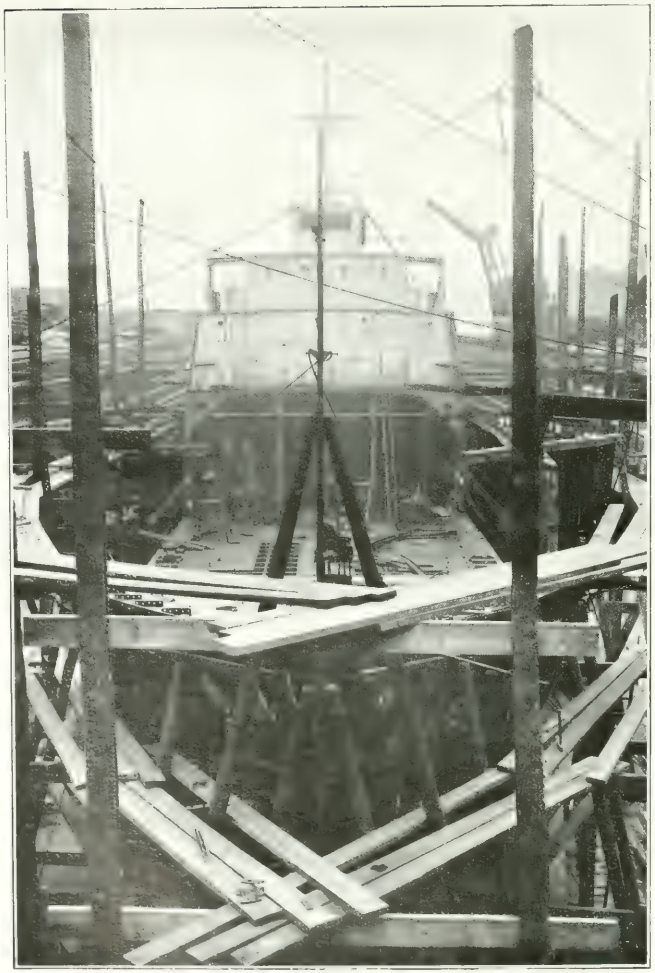
AN INTERESTING REPAIR JOB. (See page 173).



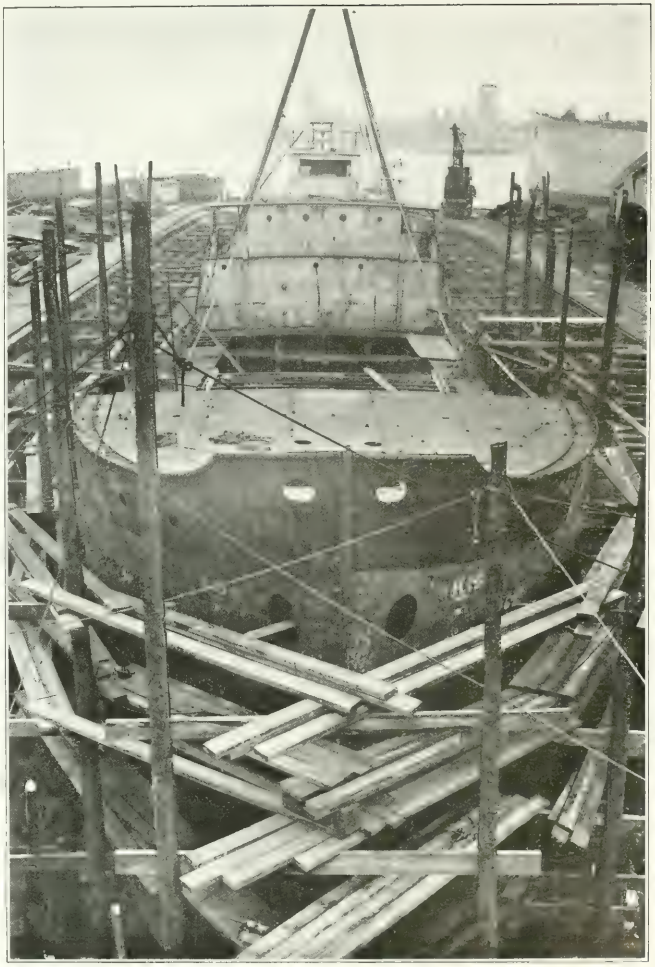
View of Vessel from Starboard Side. August 27, 1917.



View of Vessel from Port Side. August 27, 1917.



In Course of Reconstruction. September 28, 1917.



Approaching Completion. October 11, 1917.

NOTES ON WELDING SYSTEMS.*

(*Concluded from page* 144.)

(*b*) *Thermit welding* is a fusion process which is only applicable to the ferrous metals.

A mixture of aluminium and iron oxide (ferric oxide Fe_2O_3), ignited, burns or deflagrates with the formation of metallic iron and alumina. The temperature of the reaction is very high, much above the melting temperature of iron and alumina. In outline the process is carried out by fixing the parts to be joined in their proper positions and surrounding them with a mould of refractory material in which the space to receive the metal coincides with the jointing line. The mixture is put into a crucible with a bottom tapping hole over the gate of the mould, fixed, and when the reaction is complete the plug in the hole is knocked up and the molten iron allowed to flow into the mould, followed by the alumina slag, which is generally allowed to run over the top of the parts, to heat them up. The original parts are heated to fusing point, and the metal of the charge amalgamates with them when in contact, forming a fillet on the joint line. In the case of butt joints pressure is applied to force the parts together. The metal reduced from the iron oxide is nearly pure iron, but it may have a proportion of ferro-manganese or other alloy added in the crucible to make its composition match the metal of the original parts, so as to produce a homogeneous joint.

This process is analogous to the old method of "burning" for repairing broken cast-iron articles by making a stream of molten cast iron flow over the joint, but the thermit metal is far hotter, and is applicable to wrought iron or steel of most kinds. The reaction temperature is over 5,000° Fahr.

The method is employed for repair work of various kinds; for example, fractures in stern frames. In some cases the added metal may be made to supply a missing part, and machined to shape after casting. For instance, in a damaged gear wheel broken or missing teeth may be reformed from the thermit metal added.

As a refractory material mould has to be made to suit the work, thermit welding is not exactly an emergency method, and there are limitations to the size of work practicable, because the fused metal cools too much beyond some length of run.

(*c*) *Carbon arc.*—Generally known as the Benardos system. The work is connected to the positive lead, and the negative electrode is a carbon rod fixed in an insulated holder. An arc is struck by touching the work with the carbon, and withdrawing it to a distance varying with the current used. The pressure required is about 90 volts, and the current from 50 to 500 amperes, according to the size of the work. The carbons vary from $\frac{1}{2}$ in. to $1\frac{1}{2}$ in. in diameter to suit the current. A regulating resistance is used to limit the current, and closer regulation is effected by the worker's control of the length of arc. The work should be the positive electrode, as that is the hottest part of the arc, and because with the opposite arrangement carbon is carried from the movable electrode to the fixed one, and combines with the fused metal. With the correct connection it is claimed that carbon and other impurities are removed from the iron.

The temperature of the positive electrode of an electric arc is very high. In the case of carbon it is estimated at about 7,500° Fahr. In other materials it is limited to the vaporisation or boiling point of the metal operated on. It is not necessary to reach such temperatures in welding, as the carbon rod is moved along at a rate necessary to obtain good fusion to the necessary depth. The light and heat from the arc are extremely prejudicial to the unprotected eyes and skin, so that the operator must be well protected.

An Interesting Repair Job: Repairs Completed. Vessel Ready for Undocking. November 7, 1917. (*See page* 173.)

In one variety of carbon arc, two carbons are used inclined to each other, the arc being formed between them and projected on to the work by an electro-magnet like a blow-pipe flame. There is no apparent advantage in this form, but a distinct liability to the carbon being carried with the metal from the positive carbon.

The Benardos arc has been and still is extensively used for filling blow-holes in steel castings. The blow-hole surface is fused, and metal added and welded up with the original material. This method of repairing defects in castings is not always approved of by purchasers' engineers, but it seemed well proved that sound work can be secured with due care.

In making butt joints in iron and steel, the parts are abutted, and pieces of scrap of the same material are added and melted to thicken up the joint. Generally this is swagged whilst still at welding heat, the carbon and the swag being used alternately. Lap joints are made in a similar way, metal being added to level off the angle end of the lap.

Analysis of the welded metal shows that carbon, phosphorus, and manganese are removed from the mild steel, leaving nearly pure iron. This is a favourable experience, of value because it is working on a large commercial scale, but there are records of a less favourable character, showing imperfect union, oxide inclusions, altered structure, and brittleness of welded parts. The inference

* Abstract of Paper read before the Institution of Engineers and Shipbuilders in Scotland, January 15, by Captain James Caldwell, M.I.E.E., R.E.

is that the process requires skill, care, and experience. Swaging and annealing are important items, and for work where these cannot be applied, there are better methods available.

The carbon arc has been used on cast iron, with a cast-iron rod as filling material. It does not appear that carbon arc welding is in general use for other than ferrous metals, although copper can be welded by this process.

(*d*) *Metal arc.* (1) *Base metal electrode.*—In this process the carbon rod is replaced by a rod of metal of similar composition to that to be welded. The arc temperature with metal electrodes is considerably lower than the carbon arc, so there is less risk of burning the work.

In a carbon arc the material of the positive electrode is carried across the arc in the form of vapour, and deposited on the negative electrode. It may be more or less oxidised by contact with the air during the passage; therefore, if the rod is made the positive pole, metal from it is projected upon the work. In a metal arc, besides this action, molten portions of the smaller electrode are projected bodily across the arc. This seems to occur independently of the polarity with alternating current as well as continuous arcs. The point does not seem to have been investigated, but it is established that continuous current, with the rod the positive electrode, is better than alternating current, though both are in successful use. The projection effect is sufficiently powerful to overcome gravity, so that welding can be done from below. The result is that the material of the rod is transferred and forms the filling metal for the joint. Slavianoff introduced this process, and it was found to be superior in some respects to the carbon arc. There is no possibility of carbon being added to the welded metal. Suitable constituents can be added to the rod to obtain the required quality of metal in the weld, matching that of the work.

The bare metal electrode has, however, some disadvantages. The electrode is necessarily at a red heat for some distance from the arc, and therefore oxidises on the surface, and the transferred metal is more or less oxidised by contact with the air in its passage across the arc. This oxide is liable to get into the weld, forming flaws. The bare metal also dissipates a good deal of heat, thus wasting energy. On the other hand, the arc itself is much shorter than the carbon arc for equal currents, and less energy is radiated from it.

The bare metal electrode is used considerably in the United States, but there is very little European experience available as to welding with bare metal electrodes.

(2) *Coated metal electrodes.* (*a*) *Gaseous flux process.*—In this process, which was originally patented and developed by Kjellburg, the metal electrode is covered with a fireproof sleeve of non-conducting material, so that as the metal is removed by the arc the sleeve projects beyond the end of the rod, forming a guide for the molten welding metal, the sleeve itself falling away automatically. This sleeve also protects the metal from oxidation and reduced heat losses.

It is an improvement on the bare metal electrode, and a great deal of satisfactory work has been done with it—namely, in repairing marine boilers, stern frames, and other ship parts.* It is also successfully used to build up worn parts, such as propeller shafts, worn crank shafts and axles, which are afterwards machined to size.

The patent claims the use of no particular material for the fireproof sleeve, and no other purposes than those mentioned, but the companies exploiting the process claim that it can be made the vehicle of constituents which will give desired characteristics to the added metal.

(*b*) *Liquid flux process.*—In this process, invented by Stromenger, a sleeve or covering is applied to the metal, and the material of this sleeve is such that it melts and forms a flux covering the end of the electrode and the added metal, thus protecting both from oxidation. The flux may contain constituents having a chemical action upon the fused metal, to improve its qualities. It is usual to clamp the rod in a holder, moving it by hand along the length of the weld at a suitable rate, and giving it at the same time a swinging movement across the line of weld, as is done in blow-pipe welding. The arc is formed entirely within a sheath of molten flux, so that the metal is at no time exposed to oxidation. The arc is very short, about $\frac{1}{8}$ in. as a rule.

The covering material used generally has asbestos as a basis, which is impregnated with salts calculated to combine with the asbestos to form a mixed silicate flux or slag of suitable viscosity and with the property of cleaning the metal surfaces from oxides, &c. The viscosity of the molten slag is of importance. It must be sufficiently fluid to permit the free movement of the rod working in it, and to free itself from the molten metal, but not so fluid that it is blown away from the weld by the gases escaping from the arc.

The material of the rod can be varied to suit the work. For example, nickel-plated rods are made for the special purpose of welding high-speed tool steel into mild steel shanks. Compound rods are made, and an aluminium ribbon or wire is sometimes wrapped round the rod, before the flux coating is applied. Since the fused electrode metal is protected from oxidation by the flux it can be so compounded as to give a welding material of any desired composition, which is of considerable importance when the weld has to resist high stresses, or when the added metal has to act as a reinforcement, or has to be machined to form a working part or surface.

The fluxed metal arc process is certainly of the greatest promise for constructional welding, as, for example, in shipbuilding. Trials already made on full scale show that in some respects it is superior to riveting. Actual experience in ships in service is wanted to show whether these last results are borne out in practice, because no testing machine can reproduce the complete stresses endured by a ship in service. There is already good reason to say that, if welding can replace riveting, there will be a considerable saving in material and labour in shipbuilding. Whether an all-welded ship is practical or not, this method of welding is satisfactory for a large number of constructional details.

Butt joints must be suitably prepared by veeing and fitting. Plates under $1\frac{1}{4}$ in. thick need not be veed, as complete fusion for this depth can be assured. The angle of the V should be no larger than to permit the end of the electrode to get well down to the lower surface. In thick work it is usual to supply several layers to get full thickness. The slag should be removed from each layer before another is applied, and the surface brushed bright with a wire brush.

The rod is held at right angles to the face of the work. Care is necessary to maintain the arc at the proper length. If the electrode touches the work it will probably stick. It should be fed down at the rate at which it melts, or the arc will break from the great length. Excessive length of arc short of the breaking point tends to produce porous metal. The rate of feed along the joint should be steady, so as to produce a layer of even thickness.

Particulars of Typical Plant.

(1) *Self-contained.*—A self-contained plant for electric welding consists of a prime mover of some kind driving a generator of electrical energy in the form required for the process to be used and of sufficient output.

The driving engine should be well governed, and have some reserve of power, so that it will not drop speed seriously upon a temporary overload. If driven from general shafting, ample provision for large changes of load are necessary.

The type of generator used must be alternating current for resistance methods, and continuous current for carbon arc methods. For metal arc welding either continuous or alternating current may be used, continuous for choice. The generator should be self-regulating with a wide range of load, so that the voltage will not fall excessively with momentary large currents. This can be ensured by compound winding in the case of continuous current machines. The load fluctuations are greatest when only one welding apparatus

* *Vide* A. Scott Younger's paper, Proc. Institution of Engineers & Shipbuilders in Scotland, 1910.

is served, so that good governing and regulation are of greatest importance for such use, and interpole machines are preferable.

(2) *Connected to a general supply.* (*a*) *Direct current.* The most important factor to be considered is the supply pressure. Steadying and regulating resistances in series with the arc are necessary to limit the current flowing. A supply at from 100 to 110 volts should certainly be available to overcome the variable resistance of the liquid flux, although less pressure is sufficient to maintain the arc with bare carbon and metal electrodes. If the general supply is at such a pressure, nothing in the way of special apparatus is necessary. The general supply pressures mostly found to-day are from 200 to 250 volts, distributed in most cases by a three-wire system having twice that pressure across the outer conductors. It is therefore necessary to use a motor generator set, *i.e.*, a 100 to 110-volt dynamo, driven by a motor fed from the general supply, or when the pressure is to be halved, a reducer set may be employed comprising two motors of from 100 to 110 volts connected in series with the welding current, taken from the terminals of one machine. The losses by such conversion should not exceed 20 per cent. of the energy actually used by the welders if the use is reasonably continuous.

For resistance welding from direct-current supply, a motor generator must be used, the generator giving an alternating single-phase current. The supply pressure is not important.

(*b*) *Alternating current.* (1) *Single-phase.*—If the supply pressure is at or about 100 volts, it can be connected directly to metal arc welders with only the necessary regulating resistance in series. If the supply pressure is above 100 volts it is advisable to transform it to that pressure for metal arc welding, using a static transformer with separate windings, and rated for intermittent working.

For resistance welding the supply pressure is not material. Each welder has its own transformer, which can be wound on the primary side for any supply pressure. The welder pressure is always very much lower than the supply pressure (1 to 3 volts), and the currents used are relatively very great, so that it is not practicable to use the supply current directly with a resistance to reduce the voltage.

(2) *Three-phase.*—It is not easy to obtain a single-phase current from a three-phase supply, inasmuch as a transformer must be used with its secondary windings connected up in a particular way.

Welders can be connected to the separate phases, each of which yields a single-phase current, but the objection to unbalanced loads has to be met, and this method is not to be recommended, unless the number and constancy of use of the welders ensure a fair balance between phases.

Before deciding to utilise public supplies on either the two or three-phase systems for welding installations of any magnitude, it is wise to consult the supply authorities and obtain their assent to the connections to be used. It may be expected that in every case they will require the installation of transformers between the supply and the welding circuits, and this is generally advisable for convenience and security of working, as well as to obtain the most convenient welding voltage. When continuous current is necessary, as in carbon arc welding, a motor generator must be used to convert the alternating current supply to continuous.

(3) *Distribution methods.*—Circuits independent of lighting and motor circuits should be used for supplying welders. The conductors must be sufficiently liberal in size to ensure full voltage at the farthest point when all the welders are in use. Double-pole switches are necessary when the current is taken directly from a general supply, but if the supply is generated on the premises, or supplied through a transformer or motor generator, one of the leads should be earthed—viz., that to which the work is connected, and in this case only single-pole switches on the insulated side are necessary.

The flexible leads to electrode holders require some attention. The conductors should be of fine wire strands, sufficient length and arrangement of fittings being made to permit freedom of movement without liability to kinks, and the cable protected with tough durable material, such as "cab tyre" sheathing. In the case of carbon arcs, the last foot or two may be protected from the heat of the arc by an asbestos covering.

The regulating resistances used to limit the current must have a sufficient range to suit the variety of work to be done. Some part of this resistance should be permanently in circuit—*i.e.*, the regulating switch must have no position cutting out all the resistance. This permanent resistance limits the current to a maximum independently of the operator's skill, care, and inadvertence.

The resistance should be protected so that nothing can come into contact with the current-carrying elements, but ventilated and placed in a position where the heat produced will not inconvenience the operator or cause any fire risk. The actual resistances should be capable of carrying their rated current continuously without allowing a temperature in excess of boiling point.

Operators. (1) *Repair work.*—Repair work requires superior skilled operators, as every job varies. The methods of fixing parts, countering the effects of expansion, ensuring correct relative position in the completed work, finishing in a workmanlike manner, all demand experience and judgment as well as operating skill. Differences of thickness, risk of damage by overheating, necessitates the man on repair work being a good all-round mechanic, acquainted with the material, construction and working of the article he is handling. For boiler and ship repairs a boilermaker is suitable; for engine and machinery repairs a fitter will be better after training with the welding apparatus. Repair work is, in any case, work for a skilled man, and only experience can produce a man suitable for this purpose.

(2) *Repetition work* is comparatively easy, as the preparation of material, provision of fixing apparatus, &c., will have to be made. Indeed, with resistance contact welding the operator has little to do but see to the supply of material and watch the product from time to time. As the switching on and off of the current is automatic in such cases, adjustments can be made by a charge hand exactly as tool setting is done on automatic machine tools.

With any form of gas welding, or arc welding, manipulative skill has to be acquired. The correct adjustment of gas mixture, correct position of flame in respect to the work, and the welding rod in the one case; the regulation of current, proper length of arc, correct position and distance of electrode in the other, have to be learnt. Further, the operator must watch the work, know the indications of true union of the fused metals, learn to weld from the bottom, upwards, how much metal can be added in each layer, and the proper rate of advance and swing of the blow-pipe or electrode. All this can be taught to an intelligent youth or girl in a very few weeks sufficiently to make them useful operators on a single repetition process.

Perhaps the most important qualifications are watchfulness and perception, which enable the operator to detect anything abnormal in the product or in the tool itself, and thus prevent the output of faulty work. This is particularly the case in welding, where defective work may be hidden by an apparently perfect surface, and for this purpose periodic examination and testing of work are necessary. Hence repetition work by any suitable welding process can be carried out under quite similar labour conditions to other repetition work, whilst it offers prospects of development into a skilled mechanic of the abler operators at least as good as those open to machine operators in other trades.

For permission to present these notes to this Institution the author is indebted to Colonel Sir Robert S. Horne, K.C., Director of Materials and Priority to the Admiralty, and also to Mr. Kissane, with whom he has been associated in connection with the allocation of oxygen supplies.

He wishes also to acknowledge the help received from Mr. H. M. Sayers when assembling the particulars included in this paper, and also the loyal assistance of Lieutenant F. E. Saunders, R.E., and his other officers. These and the Admiralty staff of Royal Engineer operators, available to train local labour, are skilled in the application of welding systems to hasten the output of munitions, including ship and aircraft construction, throughout the country.

GLASGOW SHIPOWNERS' ASSOCIATION.

Decrease in Clyde-owned Tonnage.

The annual report of the Glasgow Shipowners' Association, which will be submitted at the annual general meeting of the Association, to be held to-morrow (Friday), has been prepared by the directors. It contains a review of the work of the Association during the past year, and a number of matters affecting shipowners on the Clyde and elsewhere are dealt with. In the course of the report the directors state that during the past year the difficulties of the shipping trade have been even greater than in the two previous war years. The loss of British tonnage, as mentioned by the Prime Minister on December 20, and the larger demand on the merchant shipping by the Government for war services and for the Allies, has greatly reduced the tonnage available for trading purposes. Successful steps have been taken by the Shipping Controller and the Ministry of Munitions to accelerate the discharge and loading of ships, but the time so saved has to some extent been lost by the necessary loss of time waiting for convoys, and reducing the speed of the faster to the level of the slower vessels. The shortage of office staffs, the multiplicity of forms to be filled up, and of consents to be obtained from authorities on the Clyde and in London, have added to the complications, and it is highly creditable to shipowners and their staffs that the work has been carried on so successfully. While recognising the needs of the Army, the directors trust that in the national interest shipowners and their essential assistants will be recognised by the Authorities as doing work of the highest importance. The directors again acknowledge the indebtedness of the country to the officers and men of the Royal Navy and of the mercantile marine. Both services are engaged on the same national and patriotic work with the Army, and it is hoped that their united efforts will bring the war to an early and victorious conclusion.

The Loss and Sale of Ships.

The directors regard with regret the great reduction in the number of ships registered and managed at the port of Glasgow. Part of this is due to the loss of ships and is unavoidable, since privately-owned ships cannot be built meantime to replace those lost. On the other hand, it is to be hoped that Glasgow may retain its position as one of the principal ship-owning centres. The war has shown the enormous importance in the national interest of the maintenance of the merchant marine as a strong and independent service, relying only on the skill, enterprise and resources of the members of the trade. They sincerely hope that all Glasgow firms of shipowners may soon again be running their own fleets, and it is hoped the Government and Parliament will adopt a policy which will give encouragement and confidence to shipowners to put their capital in ships.

The enormous earnings of neutral ships, notably in Norway, Denmark, Sweden, Holland and Spain, and also in the United States and Japan, and their comparative freedom from Government restrictions and penalisation of profits, have enabled owners in these countries to amass a great amount of capital. With every encouragement from their respective Governments they have not been slow in availing themselves of the opportunity to extend their tonnage, and are rapidly gaining a position in the world's trade which could never have been obtained under normal conditions. It will take British owners many years of unrestricted activity to regain the position so lost, and every effort should be made to impress this upon the Government and the country. No argument is needed to demonstrate that the existence of the nation is dependent upon a strong and predominant mercantile marine, and this can only be attained if managed and developed by private enterprise, under just laws and equal taxation.

The directors in concert with other shipowners' associations opposed, but without success, the unprecedented proposals of the Government that shipowners should alone among all traders be deprived of the right of averaging their losses and their profits for the imposition of excess profits duties. What has been granted to all other traders has been refused to shipowning companies, whose business, our public men tell us, is absolutely essential to the maintenance of our position as a nation. The directors mention the matter in order that they may record their protest against the departure from the principle of equality of taxation which has been accepted for generations by all parties in the State.

Labour at Glasgow Harbour.

During the earlier months of 1917, work at the docks was carried on under the terms of the award issued by Sir George Askwith in November, 1916. With regard to general cargo work, and other work paid for on time rates, the award operated fairly satisfactorily for some months after the removal of some initial difficulties. It was not till May, 1917, that the restiveness among the dock labourers which usually precedes the putting forward of new demands for increased wages became evident. With regard to the discharge of iron ore, for which a system of piecework payment had been introduced by the award, considerable difficulties were met with, and much work fell upon the Ore Committee appointed to deal with questions affecting the ore trade at the harbour. In May, demands for an increase of 2d. per hour, or its equivalent, were put forward for all sections of dock labour. This application was ultimately submitted to the Committee on Production, who in June issued a finding which granted increases of 1d. per hour to time workers and ½d. per ton for night workers at ore. This was followed by demands for increases of 2d. per hour for time workers, of 35 per cent. for piecework at grain, and 2d. per ton and various subsidiary demands for work at ore. Local conferences between the parties failed to come to an agreement, and the assistance of the Committee on Production was again requested. The Committee issued an award granting an increase of 1d. per hour to dock labourers with the exception of grain weighers, whose claim was left over to be the subject of further negotiations. Ultimately an increase of 10 per cent. over pre-war rates was granted to the grain weighers.

The insufficiency of the supply of labour has been aggravated by the irregularity in the arrival of cargoes due to war conditions. Civilian labour has, however, been supplemented by men of the Transport Workers' Battalion.

Italian Ferro-Concrete Ship of 3,500 Tons Deadweight.

Hansa reports that a newly established Italian yard proposes to build a sea-going ferro-concrete vessel of 3,500 tons d.w. and 7,000 tons displacement. The principal dimensions are 259 ft. by 46½ ft. by 23 ft., and a speed of 9 knots would be obtained either by steam engines or oil motors. Concerning this report Steinert says: "The weight of the vessel fully equipped but without cargo is 50 per cent. of the laden displacement, compared with 33 to 35 per cent. in the case of steel vessels of equal deadweight capacity. Concrete construction is thus extraordinarily heavy; and owing to this, larger dimensions, higher horse-power and higher fuel consumption are needed for equal deadweight capacity. The cheaper construction of concrete vessels is thus counterbalanced to some extent. It is possible that the weight of concrete vessels may be reduced as experience is gained; otherwise ferro-concrete will be abandoned as a constructional material for sea-going vessels, directly the steel market becomes easier and supplies more plentiful."

[Reference to curves given by Mr. R. N. Stroyer in these columns a few months ago will show that it ought to be possible to keep the hull weight in a vessel of 3,500 d.w. down to 40 per cent. of the displacement; for given deadweight capacity, the displacement of a ferro-concrete vessel would be say 15 per cent. greater than that of a steel vessel. The corresponding increase in linear dimensions, for equal deadweight capacity, would be about 4¾ per cent.—Ed. *S. & S. R.*]

THE FUTURE OF THE INTERNAL-COMBUSTION ENGINE

On Friday evening last, Mr. P. N. Everett, A.M.I.C.E., designer in the internal-combustion engine department of Sir W. G. Armstrong, Whitworth & Co., Ltd., Elswick, addressed a large gathering of the members of the Newcastle and district branch of the Association of Engineering and Shipbuilding Draughtsmen on "A General Survey of the Internal-Combustion Engine." Mr. O. J. Williams presided.

After dealing with many other mechanical problems presented by the internal-combustion engine, Mr. Everett said that the type of engine which appeared at present to offer the most promising outlook for marine work being some form of two-stroke Diesel, it would be instructive to compare that with the triple-expansion steam set now in common use. The comparison was not made with a view to showing either to be superior, but to show the nature of the problem involved. He instanced a steam set indicating 2,180 h.p. with engines $\frac{25 \text{ in.}}{45 \text{ in.}} \times \frac{41 \text{ in.}}{45 \text{ in.}} \times \frac{66 \text{ in.}}{45 \text{ in.}}$ 180 lb. sq. in. boiler pressure, 80 r.p.m.; boilers, two of 15 ft. 6 in. diam., 11 ft. 9 in. long; total heating surface, 6,100 sq. ft., and said the shaft horse-power of such a set would be about 1,980. Assuming the equivalent Diesel set to have six single-acting cylinders, 330 b.h.p. per cylinder, that would require cylinders, 24 in. diam. by 43 in. stroke by 100 r.p.m.

The cylinder pressures would be:—

	Steam set.	Diesel.
Maximum pressure in cylinder ...	... 180 lb. sq. in.	500 lb. sq. in.
,, load on piston	,, 39·4 tons.	101 tons.
Mean eff. pressure in cylinder ...	... 80 lb. sq. in.	100 lb. sq. in.
Ratio maximum to mean pressure	,, 2·25 : 1.	5 : 1.

The cylinder temperatures would be:—Steam to high-pressure cylinder, 180 lb. sq. in.; temperature, 380° F.; and exhaust from high-pressure cylinder, 60 lb. sq. in., 307° F.; high-pressure and low-pressure cylinders would have an equal range, approximately.

Diesel engine: Temperature of air entering cylinders, 60° F.; temperature at beginning of compression, 120°; temperature at end of compression, 1,000°; temperature at end of combustion, 2,300°; temperature at end of expansion, 1,200°; and temperature in exhaust pipe, 700°. The three penultimate temperatures were calculated from the indicator diagram, but it was most likely that the maximum temperature actually attained in the cylinder was very much higher, probably nearly 3,000°. The melting point of cast iron was about 2,000° F., but fortunately, these enormous temperatures were prevented from reaching the cylinder walls by some action on the adjoining layer of gas.

In the sets under consideration, the steam set had six furnaces and the Diesel six cylinders. About one-third of the fuel stoked on to the boiler grate was burned in the small cylinders of the internal-combustion engine, but combustion took place in about one-tenth of the time. The heating surface per furnace for the boiler was about 1,020 sq. ft. The surface per cylinder enclosing the combustion space was about 7·8 sq. ft., and the total cylinder surface for carrying away the heat was about 30 sq. ft., *i.e.*, less than one thirty-third of the surface available for heat transfer in the boiler. These figures gave some idea of the tremendous intensity of the combustion in the cylinder of an internal-combustion engine.

These facts were sufficient to show the absolute necessity of specially selected materials, special arrangements for lubrication, and exceeding great care in design, manufacture and operation. In a steam set, fuel was supplied by the shovelful at the pleasure of a fireman. In the Diesel set it was fed mechanically in definitely measured quantities—about ·025 of a lb. in the case under consideration—and any great increase in the amount might, with an extra supply of air, blow the cylinder cover off. That question of independence of the human element in fuel feeding would appeal to the seagoing engineer, judging by the condition most firemen were said to be in when leaving port.

As to the present application of internal-combustion engines, the speaker showed a slide of an ordinary suction gas producer for the generation of gas from coal or other solid fuel, and stated that very large plants operated on the Mond system. The most interesting development of recent times in the gas engine was the inverted vertical tandem 4-cycle engine introduced by the British Westinghouse Company and now made up to 1,000 b.h.p. Large gas engines, 3,000 h.p. in two tandem horizontal cylinders on one crank, were common in the U.S.A. and in Germany, the largest gas engine installation in the world being, probably, that at the Deutscher Kaiser Works at Bruckhausen, where over 63,000 h.p. were installed in one building. He showed slides, also, of the application of the Mirrlees Diesel engine to the drive of a cotton mill in India, a pumping plant at the Manchester Ship Canal, and an alternator.

Reverting to the marine use of these engines, he said the scope was too large for the limits of his paper. Although we had not as yet a home supply of suitable fuel, a boat trading with a country with an oil supply could fuel there, taking in sufficient for the round journey, and still devote less space to bunkers than in the present steamship. The war had, however, surely taught us not to develop our necessities so as to be dependent on any other nation, and it appeared obvious, therefore, that either an oil engine running on tar oil or a gas engine and producer must ultimately come, even for marine propulsion. Meanwhile, the present Diesel engine was being severely tested and, to give it a fair chance, the naval architect should see that the seating was amply strong. Many cases of crankshaft fracture and other failures had been directly traced to excessive vibration due to weak seats. Further, more care must be exercised in installing the engine in the boat, it being necessary to rebed the crankshaft and the main bearings after the bedplate was lined up and before the remainder of the engine was assembled. He concluded his reference to this part of his subject by showing a slide of a 4-cycle reversible marine Diesel engine, designed and manufactured at Elswick, the first of a set of entirely new designs, which, put under test and after a total of nine hours' tuning up, carried through successfully a full-power non-stop trial of 72 hours' duration, equal to over 1,000 miles running of the boat.

Mr. Everett gave a few average weights for various classes of engines, remarking that the comparison was no less startling than that of sizes.

Description.	Weight, lb. per B.H.P.
Triple-expansion steam engine for cargo boat (no boilers or auxiliaries)	130
Triple-expansion steam engine (including boilers and auxiliaries)	150
Diesel engine for cargo boat (no auxiliaries)	200
,, ,, ,, ,, (with all auxiliaries) ...	400
Turbines for cross-Channel boat (with boilers and auxiliaries)	200
Diesel engine for motor boat	40
Steam reciprocating engine for motor boat	50
Petrol engine for motor boat	10
Petrol engine for aeroplane	7
Aero engine ...	2½

Concluding, he stated that an alteration in principle of the internal-combustion engine which had received considerable attention for some time without much show of success was the application of the turbine principle; if ever that was made a practical success great strides would have been made. As regarded detail improvement, the following were the obvious directions in which to look:—Increase in power per cylinder; reduction of the losses of the heat balance; reduction of the ratio of maximum pressure to mean pressure in the cylinder, which ratio was high for the internal-combustion engine; and special improvements designed to make an engine more suitable for a particular service.

GENERAL NEWS SECTION.

PERSONAL.

Mr. William Samuel, of Llanelly, shipowner, who died on October 2 last, left estate of the gross value of £45,521.

Mr. Arthur Hill Gunn has been elected chairman of Sir John Gunn & Co., Ltd., Cardiff, in the place of the late Sir John Gunn.

Mr. John W. Hughes, senior partner in the firm of T. & J. Harrison, shipowners, of Liverpool and London, whose death occurred on November 20, 1917, left estate valued at £542,733.

Admiral Sir Rosslyn Wemyss, K.C.B., First Sea Lord, will preside at the Annual Court of Governors of the Seamen's Hospital Society, at Princes' Restaurant, Piccadilly, on Thursday, March 14, at 3 p.m.

Mr. Jameson A. Hankey, late of the firm of Gellatly, Hankey & Co., ship and insurance brokers, whose death occurred on October 23, 1917, left estate valued at £48,048, with net personalty of £18,547.

The death occurred, on February 7, of Professor George Labour, Vice-Principal of Armstrong College, Newcastle-on-Tyne. He was 70 years of age, and had been a member of the staff of the college for 45 years, and was Professor of Geology.

The death has occurred of Mr. J. A. Thompson at the early age of 41 years. He was not actively associated with, but was interested in the Sunderland shipbuilding firm of J. L. Thompson & Sons, Ltd., and was the eldest son of the late Mr. Robert Thompson, a member of the firm.

The death occurred on February 7 of Mr. Gerard Frederick Miller, in his 85th year. He was one of the oldest members of Lloyd's and served on the Committee for a number of years. In 1892 and also in 1899 he was deputy-chairman of Lloyd's. He was also a member of the Committee of Lloyd's Register of Shipping from 1888 to 1892.

The death occurred, on February 2, of Captain J. McGillivray at the age of 63 years. He was an old and trusted servant of the Glen Line, Ltd. (McGregor, Gow & Co.), which he joined in 1884, and had a successful career. He had commanded some of the finest ships in the service, and was well known and respected in the Far East where he had many friends.

The death is reported through enemy action of two captains in the Newcastle marine from the port of Belfast, Captain Robert Suffern and Captain M. Macaulay. Captain Suffern was well known in the Baltic trade before the war and Captain Macaulay spent the greater part of his career in the North Atlantic service. They were in the service of the Western Steamship Company, Ltd., for many years.

The death occurred last week, at Cardiff, of Mr. William Thomas, who was for more than 20 years superintendent engineer for Foster, Hain & Co., Managers of the Hain Steamship Company, which undertaking was acquired some months ago by the Peninsular & Oriental Steam Navigation Company. Mr. Thomas was a well-known figure at Cardiff and in the North, where his duties frequently took him.

The funeral took place at Eskdale, Cumberland, on February 9, of Mr. James Hall Rea, a partner and also one of the founders of the firm of R. & J. H. Rea, shipowners and coal contractors, of Liverpool, London, and elsewhere. The deceased gentleman was 66 years of age, and started his business career as a cotton broker. His brother, the late Right Hon. Russell Rea, having built up a substantial coal and iron business, he left the cotton trade, and joined him in establishing the present firm, from which emanated the Rea Transport Company and the Rea Shipping Company, both of which are at the present time doing useful national work. He succeeded the late Right Hon. Russell Rea as Chairman of the Company, but owing to ill-health he retired some years ago from active direction of the business.

SHIPPING SHARES AND THE CONTROLLER.

A new stipulation inserted in the Defence of the Realm Regulations was the subject of some discussion in the Stock Exchange last week. The Shipping Controller already possesses the power to control transactions involving the transfer of tonnage of which many instances are constantly taking place, but whilst the regulations imposed the necessity of obtaining the approval of the Shipping Controller it did not specifically apply to the purchase of shares in companies owning ships or to other methods of obtaining control of ships. The new regulation now provides that :—

"For the purpose of this Regulation a person shall be deemed to purchase a ship or vessel if by means of the purchase of any shares in the ship or vessel, or by means of the purchase of any shares, stock or Debentures or other securities issued by a company, or by any other means whatsoever, he acquires the control of the ship or vessel, and the expression 'the purchase of any ship or vessel' shall be construed accordingly."

At first glance the new regulation appeared to put an embargo on any kind of dealings in shares of shipping companies, but it has since been stated officially that ordinary dealings in the market are not affected. It will, however, effectually prevent the quiet buying up of shares on the Stock Exchange by one company in order to obtain control of another undertaking of which there have been some notable instances since the war began. Directors and managers who have been unwilling to part with their undertakings have hitherto sought protection by taking powers under their Articles of Association to refuse to transfer shares so purchased. The Shipping Controller has now made such buying for control impossible without his sanction.

THE "PELAYO" LOSS.

Our marine insurance correspondent writes :—

The marine insurance market has taken an unusual amount of interest in the case which has just been decided, by which the loss of the steamer *Pelayo* has been decided as attaching to the marine policies. Generally the cases where doubt exists as to whether a vessel is a marine or a war loss, run on familiar lines. Missing vessels are judged on the state of the weather and the prevailing conditions as to the known presence of enemy submarines. Collision cases rely on whether either vessel, both, or neither, were at fault. In the *Pelayo* case, however, we have a definite claim on the part of the enemy to have sunk the vessel. A claim not much weakened by a half-hearted disclaimer on the part of the German Foreign Office. The case may be regarded as a triumph for the reputation of Lloyd's in the matter of the reliability of the information collected for the benefit of the shipping community. It is no small thing for a corporate body to be held more trustworthy than the chancellory of a nation, however great the repute of the body may be, or the disrepute of the nation. Yet, further, the evidence of two alleged survivors was stamped as false, though here it may be presumed that the necessary identification of these persons was not forthcoming, or at least, not convincing. From the business point of view the result of the case must be accepted as a just one. The matter was brought before the court in order to settle the question of liability in an amicable way, and the marine underwriters appear content with the finding of the court.

FROM OUR CORRESPONDENTS.

CLYDE DISTRICT.

(From Our Own Correspondent.)

Steel Company of Scotland.—The announcement is made that the Steel Company of Scotland, Ltd., have sold their interest in the Appleby Iron Company, Ltd., to Steel, Peech & Tozer, Ltd., on terms which the Scottish concern consider satisfactory.

Harbour Workers' Wages.—An application was made recently by a number of employees of the Clyde Navigation Trust to have their wages increased, and as the request was not granted by the trustees the matter was referred to the Committee on Production for settlement. The Committee decided that the workers were entitled to an advance of 5s. per week. In order to place other employees on a similar footing to those who participated in that increase, the trustees decided to revise the scale of wages paid to all employees on the wages bill and to grant them an advance of 5s. per week to date from December 5. This does not, however, apply to workmen whose wages are regulated by the standard rates paid in the district. Since the war began the trustees have granted advances of wages which amount in all to 20s. per week. The increase now conceded will involve an additional expenditure of £15,000 per annum.

Anchor Line Losses.—Among the larger shipping concerns of the country the Anchor Line have lost pretty heavily as a result of the enemy's submarine campaign, some of their best and fastest liners having been sunk. The *Tuscania*, lost off the Irish Coast last week, was one of the most notable vessels of the fleet. Along with the *Transylvania*, she was originally built for the Cunard Line, but both were transferred before completion to the Anchor Line. The *Tuscania* was a twin-screw steamer of 14,348 tons, propelled by geared turbines, both hull and machinery having been built by Alex. Stephen & Sons, of Linthouse. Her companion ship, the *Transylvania*, was constructed by Scotts' Shipbuilding Company, of Greenock. The vessels were the first large steamers built for passenger service on the Atlantic to be fitted with geared turbines. The *Transylvania* was sunk while acting as a troopship in the Mediterranean last year. The *Cameronia*, the *California* and the *Caledonia*, all large passenger liners of the same fleet, have been sunk by enemy action. In the case of the last mentioned vessel, her master, Captain Blaikie, was taken to Germany as a prisoner.

Damage to Quay Walls at Glasgow.—The subsidences which took place some time ago in the foundations of certain quay walls at Glasgow Harbour present a serious problem to the Clyde Trustees. The sandy nature of the substrata renders it extremely difficult to prepare foundations for the support of the walls. At Plantation Quay a portion of the wall, 330 ft. in length, collapsed entirely, and in consequence well over 1,000 ft. of the quay area has been closed to shipping. At Mavisbank a portion of the ground behind the quay has subsided, and it has been decided not to use the berthage there in the meantime. At a meeting of the trustees last week, the matter came up for consideration, but nothing definite was done with regard to reconstruction of the fallen wall of Plantation Quay. Meantime, however, the engineer of the Trust was instructed to prepare plans showing the method in which he would propose that the quay should be rebuilt. Consideration of the question of strengthening Mavisbank Quay was also continued until inquiries have been made into the present necessities of berthage and traffic. The engineer was instructed to deposit material along the front of the quay to prevent movement of the wall. Arrangements have been made for accommodating elsewhere the vessels usually berthed at Plantation and Mavisbank.

A Question of Discharge.—An interesting case from the point of view of both shipowner and shipper has just been decided by the Court of Session. The owners of the Norwegian steamship *Hansa* sued a firm of timber merchants in Ayr for payment of £490 as demurrage for the detention of the vessel at Ayr for seven days beyond the lay days allowed for the discharge of the cargo. Under the charter party it was agreed that the vessel should proceed to Archangel, there to load a cargo of wood, and afterwards proceed to Ayr and deliver the cargo. The defence was that the delay in discharging was caused by the failure of the steamer to give delivery at the rate provided for in the charter party. Lord Hunter, in pronouncing judgment, repelled the defences and granted decree for the sum sued for. His lordship said the cargo consisted in all of 630,576 standards. The stipulated time for discharging was six and a-half days. The *Hansa* arrived at Ayr on November 17, 1915. Notice of readiness to discharge was duly given. The steamer was ready to discharge at 10 a.m., and discharging actually commenced at 3 p.m. on November 17, but was not completed until 6 p.m. on December 2. The cause of delay in discharge was proved to be shortage of labour. No fault for this state of affairs was attributable to the pursuers or to those for whom they were responsible. The risk of delay arising from causes for which neither of the contracting parties was responsible was with the merchant. It was admitted that the mechanical fittings of the *Hansa* were such as to admit of the vessel under normal circumstances being discharged within the period fixed by the charter party.

SCOTTISH EAST COAST DISTRICT.

(From Our Own Correspondent.)

Aberdeen Harbour Rents.—A proposal was made recently to increase the rents levied by Aberdeen Harbour Board for land and premises leased by them. This matter was discussed at a meeting of a committee of the Board last week, when deputations were received from the yearly leaseholders and also from the long leaseholders. After discussion it was agreed to increase the rents by amounts ranging from 1d. to 3d. per £1.

Leith Engineers' Wages.—At a meeting of Leith Dock Commission held on Friday, it was decided to grant a further increase of 1½d. per hour to all men in the engineering trades in the employment of the Commission. The grades participating in the advance include fitters, blacksmiths and others. A further increase of 4s. 9d. per week was granted to dock gatemen, making 46s. per week; and 5s. 9d. to dock deputies, making 53s. per week. The wages of the chief deputy were raised by 6s. 9d., making 60s. per week in all.

Stonehaven Harbour Dues.—At the annual meeting of Stonehaven Harbour Trust last week it was reported that a communication had been received from the Board of Trade to the effect that the works executed afforded increased accommodation and justified an increase of the harbour dues. The matter was remitted to the Finance Committee of the Trust. The trade of the harbour was reported to be better during January last than in the corresponding month of 1917, the revenue for the month showing an increase of £34. Some damage has been done to the harbour by recent storms, and it was stated that another section of the outer harbour had given way. The Trustees decided to get a report from an engineer with a view to repairing the jetty.

Aberdeen Ferry Finances.—Aberdeen Harbour Commissioners, who have had control of the ferry service at Albert Basin for the past ten years, have suffered considerable financial loss in maintaining the service. While one or two years show a credit balance, there have been considerable deficiencies to make up in other years. Detailed accounts show that in 1909 there was a deficiency of £37, and in 1910 of 16s. In 1911 there was a surplus of £15, but in the years from 1912 to 1917 the deficiencies ranged from £9 to £337. A communication with regard to the matter was recently sent by the Commissioners to the Town Council, and in drawing attention to the losses sustained the Commissioners expressed the hope that the Council would give the matter their favourable consideration and see their way to remit or substantially reduce the annual payment of £50 by the Board for the ferry.

NORTH-EAST COAST DISTRICT.

(From Our Own Correspondent.)

Wireless Telegraphy.—The Department of Wireless Telegraphy at Rutherford College, Newcastle, which was equipped by Newcastle shipowners, is proving a marked success in the matter of attracting students. At a recent first examination 21 out of 24 candidates carried off the necessary qualifying certificate, and it is of interest to note that five of the successful candidates were wounded soldiers who have now made themselves efficient for further service in another sphere. The vacancies in the classes after the first examination were immediately filled by the holders of scholarships awarded by the Marconi Company. This second batch is now well forward in the matter of training, and applications are being received for the vacancies that will occur after the next examination.

Serbian Commercial Mission.—Every preparation was made by the civic authority and the leading commercial men of the

district to give a cordial welcome to the Serbian Commercial and Industrial Mission, which arrived in Newcastle on Feb 8, and to interest the members of it in the industrial features of the city and neighbourhood during their visit, which extended over the week end. Lord Joicey, the President of the Newcastle Chamber of Commerce, met the guests on their arrival at the Central Station, having travelled from Edinburgh, and the greeting they received was the best assurance of a pleasant visit. The itinerary of the Mission while on Tyneside included a visit to the steel works of John Spencer & Sons, Newburn ; a motor run to Springhill, Morpeth, the residence of Mr. George Renwick, shipowner ; a trip down the Tyne, and a visit to the collieries. The hospitality part of the programme was as liberal as war conditions would permit, and everything possible was done to maintain the Novocastrian tradition of extending to distinguished strangers a warm and sincere welcome.

Sutherland Steamship Company, Ltd.—An extraordinary general meeting is to be held at the offices, Sandhill, on February 19, when resolutions will be submitted to increase the capital and the capitalisation of part of the profits. The resolutions are as follows :—(1) That the capital of the company be increased to £1,000,000 by the creation of 800,000 new ordinary shares of £1 each ; (2) that the new ordinary shares shall rank in all respects *pari passu* with and be entitled to the same rights as the existing ordinary shares of the company ; (3) that the directors of the company be authorised to capitalise a sum of £400,000, part of the profits of the company which have arisen from the realised appreciation in the value of the company's capital assets (such sum to be provided by appropriation from maintenance and reserve fund or such fund or funds as the directors may think proper), and that in respect of the sum so capitalised the directors be authorised to allot to the members registered at the closing of the share register on April 1, 1918, as holding shares of the company, 400,000 shares of the company each of £1 credited as fully paid, such shares to be distributed among them in proportion to the number of shares held by them, that is to say, in the proportion of two new shares for every one share so held by such members, but the holder of such new shares shall not be entitled to any portion of the dividend for the current year ending March 31, 1918.

Scholarships for Armstrong College.—Mr. W. J. Noble, the chairman of the Cairn Line of Steamships, who has presented £2,000 to Armstrong College, Newcastle, in memory of his son, Mr. W. Black Noble, for the purpose of founding scholarships in connection with commercial education, has followed up his generous gift with one or two suggestions regarding the future training of youths intended for a commercial career that are well worth careful consideration. His views were contained in a letter read at the last meeting of the Newcastle Chamber of Commerce. Mr. Noble looks to the future, which we may be certain will call for a much higher standard of education for commercial life than has been usual in the past, and it is as well that the business community should clearly realise that probability without delay. In some of the quayside offices boys begin at 16 years of age, and serve an apprenticeship of five years, or, if they do not serve their time, as the saying goes, they are assured of a certain salary, if their period of training has been satisfactory, at the end of five years. Mr. Noble's idea is that the five years should be divided in the proportion of three years' training in the Faculty of Commerce at Armstrong College and two years in the office, thus affording a much more valuable groundwork in commercial knowledge than now obtains. There is much in the idea to commend itself to the large commercial houses, and the General Purposes Committee of the Chamber is now considering how best it can be helped forward to popular acceptance.

Control of Trade.—Newcastle Chamber of Commerce is among the "live" organisations of its kind in the country, and when the time comes for the annual meeting of the Associated Chambers in London, it is never behindhand in furnishing a number of resolutions for the agenda. For the forthcoming meeting it has approved six proposals, and duly forwarded them for the programme that is to be discussed. One subject is uppermost in all great trading and industrial centres, and that is in relation to the control of trade. Both merchants and manufacturers will be very gratified when at last the day dawns of their freedom from Government restriction and regulation. There has been the official suggestion that the control of trade should continue for three years after the war, a proposal which commercial men look upon with marked disfavour. They would welcome the demobilisation at the earliest possible moment of the whole army of officials which has held the reins over them so tightly in the past three years. In Newcastle's opinion six months' control after the war would be sufficient for all reasonable requirements, and the following resolution has been sent from the local Chamber of Commerce to be placed on the agenda of the Associated Chambers : "That this Association, while recognising that some interference with the normal course of trade is inevitable as a result of the war, is strongly of opinion that control should be limited to the minimum necessary, conducted with efficiency of management, and brought to an end as soon as possible after the conclusion of peace, and in a period not exceeding six months."

Other resolutions from the Newcastle Chamber recommend (1) the establishment, by private enterprise, at the earliest possible date, of an ample and cheap supply of electricity for all purposes ; (2) a special committee of the Associated Chambers of Commerce, representing the industry and commerce of the whole of the United Kingdom, to investigate the question of the growth of national expenditure ; (3) amendment in the patent laws in order that inventions may be encouraged and the cost of maintaining patents reduced or abolished ; and (4) that the Treasury be requested to alter forthwith its policy of retaining monies held in this country to the credit of German subjects, who at the same time are indebted to British subjects, and that immediately any resting order is obtained the Treasury pay out the amount involved instead of keeping the money until after the war. It has long been considered that the present patent fees bear very heavily on the poor inventor, and it is hoped to bring relief to this class through the proposed alteration in the law on the subject.

THE MERSEY DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

Loading and Discharging of Ships.—Mercantile Marine circles here are keenly interested in the proposition that merchant shipmasters should be appointed at the principal ports to assist the naval authorities in regard to the loading and discharging of ships, and for transport purposes generally. The question, it is understood, is to be raised in Parliament during the present week.

Insurance Interests.—The British Insurance Association which has just been formed has already enrolled 123 companies as members, and includes fire, life, marine, casualty, boiler inspection and engineering companies. The objects of the association are the protection, promotion, and advancement of the common interests of all classes of insurance business. Mr. E. Roger Owen (Commercial Union) is chairman, and the members of the committee include Mr. George Chappel (Royal), and Mr. T. H. Harper (Thames and Mersey Marine).

Norris Life-Raft.—A good deal of interest is being taken in shipping circles here in the Norris Life-Raft, which is the latest, and experts agree in describing it as one of the most efficient life-saving appliances now being made. Models of the raft are being exhibited in the Cunard Building by the Liverpool Marine Appliances, Ltd., and from the fact that it is meeting with such favour, arrangements have been made to manufacture these rafts cheaply and in large quantities by means of standard machinery. The important claim for the Norris Life-Raft is that it will automatically float off a sinking vessel, and remain afloat immune from all possibility of broaching, staving in or other damage.

Averaging Excess Profits.—Mr. George Renwick presided over the sixth annual meeting of the Manchester Steamship Owners' Association last week, and made a point in his remarks of saying that shipowners were the only people who were prevented from averaging excess profits from year to year. This, he said, was a most unfair proceeding, and one which no spirited body of men could sit down to without complaint. He also referred to the large orders being placed by neutral owners with British shipbuilders, and emphasised the competition with which British shipping would be faced after the war, not only from neutrals, but from their present Allies, who were building as rapidly as possible. He urged that the "ton for ton" policy should be officially adopted, and further that owners should press for their ships to be relieved from State control at the earliest possible moment after the termination of hostilities.

SOUTH WALES DISTRICT.

(FROM OUR OWN CORRESPONDENT.)

Trade of Swansea Harbour.—According to the official returns of the Swansea Harbour Trustees, the total imports in January last amounted to 41,168 tons, compared with 46,672 and 69,353

tons in the corresponding month in 1917 and 1916. Exports in the same month in 1918, 1917, and 1916 were :—250,905 tons ; 270,405 tons ; and 374,882 tons.

New Dry Dock for Swansea.—The Swansea Harbour Trust at their meeting on Thursday, Mr. Roger Beck, the new chairman, presiding, considered the terms for the leasing of the pill in the South Dock, for conversion into a dry dock, to Swan, Hunter & Wigham Richardson, a North Country firm of shipbuilders. The terms were accepted and confirmed by the Executive.

Swansea Shipwrights' Wages.—The Committee on Production have heard a claim made on behalf of the shipwrights engaged at Swansea. The men contend that they are entitled to the 12½ per cent. increase, on the ground that they are plain time workers. The application was opposed by Mr. J. G. Harris, on behalf of the Bristol Channel Ship Repairers' Association, on the ground that the men were piece time workers, and, also that they were not entitled to the 12½ per cent. because they had already received the 25 per cent. for acceleration of output. The award of the Committee will be issued in due course.

Outward Coal Freight Rates.—In the following table is shown the lowest, highest and average rates of freight paid from Cardiff to all ports fixed last month :—

Port.	Lowest.	Highest.	Average.
Bordeaux	34/-	69/-	51/6
Caen	46/6	48/-	47/8½
Cherbourg	47/3	48/3	47/8
Dakar	86/-	90/-	88/8
Gibraltar	100/-		100/-
Havre	22/6	45/9	30/3
Nantes	30/		30/
River Plate	120/	—	120/-
Rouen	48/9		48/9
St. Malo	22/-	-	22/
Tonnay Charente	63/-		63/

In the corresponding month last year the average rate paid for Gibraltar was 55s. 1½d., and to the River Plate 70s.

Increased Wages for Dock Workers.—The Committee on Production have issued their award in connection with applications made by the Dock, Wharf, Riverside and General Workers' Union on behalf of certain of their members. Three claims were put forward on behalf of the general cargo men in the employ of the Cardiff Railway Company. The claim that where six men constitute a gang the whole of them shall be employed exclusively in the batch, and also the demand that overtime be paid at the rate of 2s. 6d. per hour extra in addition to the ordinary wages ; in these cases the Committee found that the claims had not been established. The application for increased wages was granted, and the Committee find that as from the beginning of the first full pay day from the date of the award the men shall receive, in the case of day workers, 10d. per day and 10 per cent. on their tonnage rates in the case of tonnage men. In the case of the claim made by the crane drivers in the company's employ for an advance of 1s. 6d. per day and 2s. 3d. per night, and that overtime for week-ends be paid at the rate of 2s. 6d. per hour extra in addition to the ordinary rates, to be paid from 1 p.m. Saturday to the starting time on Monday morning, the Committee awarded an advance of 10d. per day and 1s. 3d. per night, but find that the claim for an alteration in the overtime rates has not been established. In all cases the advances are to be regarded as war wages.

Coal Exporters and Brokerage.—Considerable interest is being taken by Cardiff business men who are engaged in the coal export trade, in the action of the Controller of Coal Mines in intimating his intention of retaining the one-third of 5 per cent. brokerage hitherto handed over to the exporter, in addition to his 1s. per ton commission in respect of shipments to foreign countries. The custom for the exporter to retain one-third of 5 per cent. brokerage is very old, and was recognised under the Runciman limitation scheme of May, 1916. The duty was imposed on exporters to carry out the work in connection with the procuring of licences, all arrangements with collieries, railways, and docks for stemming vessels, Customs House formalities relating to coal, and attention to loading so far as had been previously customary at the different ports. For these services they were to be remunerated at the rate of 5 per cent. on the f.o.b. price, with a maximum of 1s. per ton on all shipments to France. They were also instructed, in order to facilitate stemming with collieries and to relieve buyers of demurrage in loading, to do all the chartering for account of buyers, and for these services they were to receive one-third of 5 per cent. brokerage on [illegible]. The arrangement was continued when the French scheme was extended at the end of October, 1916, to Italy. The exporters are hopeful that they will be able to persuade the Controller to abandon his intention.

THE FREIGHT MARKETS.

(From Our Own Correspondents.)

London.—The strong demand continues from all sections of the market for tonnage and rates are maintained at a high level. Rates from the River Plate remain at 200s. to the United Kingdom and 5s. more to France. From the ports of the North American Atlantic seaboard the chief requirement is for vessels on net form, for which 230s. is offered to this country, 260s. to France, and 360s. to Italy. Gulf loading is worth 30s. additional. There is no change in the rate for heavy grain, which is 50s. to this country, 57s. 6d. to France, and 75s. to Italy. No movement in coal cargoes from Virginia to the Plate is reported, and nitrate rates remain at 185s. to the United Kingdom. From the East the demand is strong. Karachi is willing to pay 250s. on scale basis to the United Kingdom, Bombay 275s. on d.w. to this country, and 400s. to the Mediterranean, and the Madras Coast would concede 550s. for kernels to Marseilles. The rice ports of Saigon and Burmah continue to offer 500s. to the United Kingdom or France. In the Mediterranean section of the market, chartering is being done on the basis of 45s. Huelva to the Mersey, and 60s. for pyrites to the East Coast United Kingdom, 50s. Bougie to the Clyde, 65s. Tunis to the same destination, 50s. Bilbao to Boulogne, and 80 frs. Sfax to Bordeaux. Bay rates are indicated by fixtures at 17s. Bordeaux, and 20s. Bayonne to the Bristol Channel.

Glasgow.—There has been the usual good demand for boats on the Glasgow market, but the supply of available tonnage was small and business was restricted within very narrow limits. Rates were, however, firmly maintained. Among the fixtures reported were : Bayonne, 1,800, 1,500, Bristol Channel, 20s. prompt ; States and West Indies, 2,600, 35s. one round trip, delivery and re-delivery north of Hatteras ; States and Mexican routes, about 35s., twelve months ; and Bordeaux to Bristol Channel, 17s.

Newcastle-upon-Tyne.—All last week the local coal trade was starved for want of tonnage, those collieries producing mainly for export being rendered incapable, in the majority of instances, of continuance of full employment. Happily, the beginning of this week has witnessed a considerably larger arrival of shipping, mostly officially requisitioned boats, and colliery positions are to that extent better, although very much more cargo space could readily be taken up. The number of "free" vessels on offer is still very small and, on the other hand, orders are numerous at firmly maintained figures. Chartering done during the past week has been mainly for Swedish destinations, and rates in these directions are rallying to some extent. Thus, Gothenburg has been twice arranged for at 160 kr., once at 162½ kr. and once at 165 kr., rates which compare with from 150 kr. to 160 kr. reported last week. Stockholm, which was done last week at 175 kr., has been fixed for at 180 kr. There has been no coasting business reported on the market since the new rates came into operation. Business for the coaling stations is absent and 100s. continues to be quoted for Gibraltar, with 200s. for Port Said. The rate to the Spanish Atlantic remains at 180s. for Bilbao or Santander. For Portuguese ports, 115s. continues to be quoted for Lisbon and 125s. for Oporto. The Spanish Mediterranean is a bit of a "puzzle" at present, no fixtures in that direction having been arranged for quite a long time and the quotation of 150s. to Barcelona probably represents the extreme outside figure.

Liverpool.—With tonnage insufficient for Allied wants, the high rates offering to neutral ports are unheeded. Only a limited business is passing in the controlled trades, which generally speaking are getting the maximum rates. There is a good inquiry for time charters, but with suitable boats scarce only a few fixtures are reported. Rates are firm in all trades, and for general trading 45s. has been paid for six months, while a round trip New York to West Coast South America made 40s., and a round trip in the States-West Indies trade made 35s. net. Homeward freights are quiet but firm. North America has an active demand for ships, and cargo for Europe which cannot be moved is accumulating. Net charters are in special request, and a boat, 4,000 tons, New York to Liverpool, paid the late rate of 230s. February-March. The rates on net form to France and Italy are 260s. and 360s. respectively. Eastern markets still indicate high rates for uncontrolled boats,

and Madras kernels to French Mediterranean would pay up to 550s., while 500s. to 550s. is obtainable from the rice ports to France. Bombay quotes 275s. on d.w. to United Kingdom, and 425s. is reported offering to Italy. River Plate rules dull on present basis of 200s. to United Kingdom and 205s. to France. Sail freights are active, and several fixtures have been made in the North and South American trades at firm rates.

Cardiff and Swansea.—There has been but little improvement in the outward coal freight market. The tonnage supply continues to dominate the position. A firm tone has prevailed, and for the scheduled ports maximum rates have been forthcoming. For Gibraltar the rate remains at 100s., and for the River Plate 120s. is still the value put forward. Other directions remain at previous figures. The new maximum rates published for Irish ports represents a substantial reduction on rates recently paid. The only business disclosed was for French destinations: Cherbourg 47s. 3d. (neutral); St. Nazaire 29s. (Allied) and 61s. 6d. (neutral); Bordeaux 69s. (neutral). A small sailing vessel was fixed for Granville at 90s. On the Swansea market an active inquiry has prevailed for tonnage, this was particularly the case in regard to the limitation ports. Rates continue to be quoted on the basis of recent level. The following fixtures were reported: Havre 45s. 9d.; Caen 46s. 6d.; and St. Nazaire 61s. 6d. Rochefort was done at 61s. 6d. for Port Talbot loading.

COMPANY REPORTS AND DIVIDENDS.

Hochseefischerei Nordstern A.G.—A dividend of 12 per cent. is again declared.

Rhederei A.G. von 1896, Hamburg.—The company has been exempted from presenting accounts for 1917 on the grounds that all its vessels were laid up during the whole year.

Merchants' Marine Insurance Company, Ltd.—The directors recommend a dividend of 3s. 9d. per share, free of income-tax, making, with the interim dividend paid in July last, 12½ per cent. for the year.

Howaldtswerke, Kiel.—The report for the year ending September 30, 1917, states simply that the works were occupied fully during the whole year and have sufficient orders to keep them busy all this year. An increased sum has been allocated to depreciation to cover the considerable extensions to the yard and to provide for quays and water buildings, &c., hitherto included in the site account. The gross profit was £101,600 (compared with £88,600 for the previous year). The net profit was £54,000 (£50,400). A balance of £2,340 was brought forward, after paying 5 per cent. on bonds and 8 per cent. dividend (as before).

Ulster Marine Insurance Company, Ltd.—The directors, in their 50th annual report, state that after making provision for third year claims, there is a profit of £6,721, to which has to be added £2,824 brought forward, making an available balance of £9,545, out of which the directors have written off for depreciation on investments realised during the year £1,891, to provide for depreciation in market value of securities still in hand, £2,000, and now recommend a dividend of 13 per cent., together with a bonus of 7 per cent., making a total distribution of 20 per cent., less income-tax, leaving a balance of £3,404 to credit of profit and loss. The net premiums taken during 1917 amount to £52,454, and the claims settled to £23,701, leaving, after deducting expenses, a net balance of £26,008 to credit of underwriting account.

Cardiff Railway Company.—The directors' report for the year ended December 31, 1917, states that the capital expended during the year on account of existing works amounted to £1,720. The balance available for dividend is £107,582, which the directors recommend should be appropriated as follows: dividend at 4 per cent. on preference shares, £40,000; dividend at 4 per cent. on preferred ordinary stock of 1896, £20,000; dividend at 3 per cent. on second preferred ordinary shares of 1901, £6,000; dividend at 1¼ per cent. on ordinary shares, £32,500, making a total of £98,500. Of this there has been paid by way of interim dividends on the shares and stock for the half-year to June 30, 1917, £33,000, leaving a balance carried forward to next year's account of £9,082. The import and export trade at the Bute Docks for the year 1917 amounted to 9,667,184 tons, being a decrease of 1,417,117 tons compared with 1916.

Lancashire Shipping Company, Ltd.—The accounts for 1917, now available, show that the profit on voyages, after deduction of deferred repairs, depreciation, and reserve for taxation, amounted to £137,399, while £41,182 was brought forward, making a total of £178,581. After payment of income-tax, directors' fees, and other charges, and the payment of £16,000 in interim dividend (10 per cent.), there is a balance of £134,397, which enables the directors to place £60,000 to reserve account, and to pay a final dividend of 20 per cent., making 30 per cent. for the year, absorbing £32,000, and to carry forward £42,397. The annual report states that satisfactory profits were made in the early part of the year, but latterly all the steamers have been running on requisition rates, and are likely to continue so for a considerable period, which will mean a large reduction in the gross profits for the current year, with, however, a proportionate depreciation of liability for excess profits tax. Working expenses continue to increase, and every day fresh demands involving increased expenditure are being made of shipowners by the various Government Departments. The directors have also arranged to acquire two additional steamships.

Rangoon Port Commission.—The report for the year shows a very satisfactory state of affairs. The budget estimates were framed on the same conservative lines as those of the preceding year. A deficit of over Rs. 3,20,000 was anticipated, but the revenue account actually closed with a gross surplus of well over five lakhs of rupees, of which two lakhs were transferred to depreciation and replacement and insurance funds. The receipts of the traffic department and the sum realised from river dues each exceeded their respective estimate by approximately one lakh. The export of railway materials for Government use was largely responsible for the excess over estimate under both heads, while an increase in the export of staple commodities further swelled the river dues. The receipts of the Port Department were nearly a lakh and three-quarters more than was anticipated, chiefly on account of the hire of launches and barges lent to the Government. The expenditure fell below the estimates by nearly four and a half lakhs of rupees, mainly on account of the saving on the keep of the vessels, on the salaries of employees on war service, on river conservancy owing to the absence of the *Cormorant* in Mesopotamia, and on minor works. The value of the foreign and coasting trade, which was Rs. 5,573 lakhs in 1914, has fallen by 251 lakhs.

Barry Docks & Railway Company.—The directors in their report for the past year state that the sum available for dividend on the ordinary stock is £196,925. The interim dividend of 4¾ per cent. paid on the ordinary stock for the six months ended June 30, 1917, absorbed £95,059, leaving a balance of £101,866, and the directors recommend a dividend of 4¾ per cent. for the six months ended December 31, 1917, making 9½ per cent. for the year, carrying forward £6,807.

COMPANY REGISTRATIONS.

Amble Ferro-Concrete Company, Ltd.—Capital, £25,000, in £1 shares. Objects: shipbuilders, ship repairers, shipowners, shipwrights, &c. Signatories:—

G. M. Ritchie, 2, Cumberland Terrace, Regent's Park, N.W., Chairman of Palmers' Shipbuilding and Iron Co., Ltd., Hebburn-on-Tyne.
A. N. Gowan, 7, Brandling Park, Newcastle-on-Tyne, Managing Director of Palmers' Shipbuilding and Iron Co., Ltd., Hebburn-on-Tyne.

The first directors are to be appointed by the subscribers. Registered office: 116, Fenchurch Street, E.C. Private Company.

Carnegie & Matthew, Ltd.—Capital, £5,000, in £1 shares. Objects: to take over the business of Carnegie & Matthew, ship and boat builders, &c. Signatories:—

A. Carnegie, 11, Prince Street, Peterhead.
A. Milne, 54, York Street, Peterhead.
A. Wood, 66, St. Peter Street, Peterhead.
R. L. Mitchell, 50, Broad Street, Peterhead.
W. Hay, 25, Maiden Street, Peterhead.

The first directors are: A. Carnegie, A. Milne, A. Wood, R. L. Mitchell and W. Hay. Registered office: Seagate, Peterhead. Private company.

Edgar Hamilton, Ltd.—Capital, £25,000, in £1 shares (11,000 preference). Objects: Insurance brokers and agents, insurers of vessels, cargoes, freight and other properties and interests, &c. Signatories:—

R. Keedwell, 183, Croydon Road, Anerley, S.E., clerk.
G. E. T. Stebbing, 33, Rosebery Road, S.W.(2), clerk.

The first directors are:—E. Hamilton, H. J. Relgesen and H. Holloway. E. Hamilton is managing director for 10 years at £1,500 per annum. Remuneration of other directors, £50 per annum, divided between them. Registered office: 48, Threadneedle Street, E.C.2. Private company.

Swansea Liners, Ltd.—Capital, £250,000 in £1 shares. Objects, shipowners, managers of shipping property, ship and insurance brokers, freight contractors, carriers by land and water, barge owners, lightermen, forwarding agents, underwriters, warehousemen, wharfingers, stevedores, &c. Signatories :—

W. Turpin, Mawr Colleu, Sketty, Glamorgan, shipowner.
T. Bowen, Overedge, Sketty, Glamorgan, shipowner.

The first directors are : W. Turpin, T. Borwen and T. P. R. Richards (all permanent). Qualification, £2,500. Remuneration, £100 per annum for each steamship owned by the company, divided between them. Solicitors, Ingledew, Sons & Phillips, Lloyd's Bank Chambers, Wind Street, Swansea. Private company.

Wear Concrete Building Company, Ltd.—Capital, £70,000, in £1 shares. Objects, to enter into an agreement with Swan, Hunter & Wigham Richardson, Ltd., Herman P. T. Lind and Christian F. A. Ingerslev, to construct any articles made wholly or partly of ferro-concrete, to contract for building, wholly or partly in ferro-concrete or otherwise, vessels, harbours, docks, wharves, piers, factories, warehouses and works, &c. Signatories :—

W. B. Work, 1, St. Arans Road, South Shields, accountant.
W. Farlam, 3, Frank Place, North Shields, bookkeeper.

The first directors are : W. Denton, C. S. Swan, G. E. Hunter, H. P. T. Lind and C. F. A. Ingerslev. The two last named are Danish. Registered office : 31, Mosley Street, Newcastle-on-Tyne. Private company.

Albion Steamship Freight Insurance Association.—Registered February 4, as an unlimited company, to insure, on the mutual principle or on a fixed premium basis or otherwise, against marine risks, to re-insure and counter-assure such risks, &c. The number of members is unlimited. Signatories :—

A. Munro Sutherland, 38, Sandhill, Newcastle-on-Tyne, shipowner.
M. M. Mein, 4, Royal Arcade, Newcastle-on-Tyne, shipowner.
W. Coupland, 35, Queen Street, Newcastle-on-Tyne, shipowner.
R. S. Dalgliesh, Watergate Buildings, Newcastle-on-Tyne, shipowner.
J. W. Morrison, Milburn House, Newcastle-on-Tyne, shipowner.
W. M. Good, Maritime Buildings, Hull, shipowner.
N. Brittain, Akenside House, Newcastle-on-Tyne, shipowner.

The first directors are not yet appointed. Until otherwise determined in general meeting, the number of directors is not to exceed 24, to represent such ports, and in such numbers for each port as the directors for the time being shall decide. Remuneration, not more than £500 per annum (or such sum as the association in general meeting may determine) divided between them. Bankers : London Joint Stock Bank, Ltd., Grey Street, Newcastle-on-Tyne. Solicitor : H. Ingledew, Milburn House, Newcastle-on-Tyne. Secretary : W. E. Parker, Exchange Buildings, Queen Street, Newcastle-on-Tyne.

PORT NOTES.

Lagos.—Several Chambers of Commerce in the United Kingdom have been exercised of late in regard to the slow progress being made with the scheme for improving Lagos Harbour, the wharfage accommodation, and railway approaches. Representations have been made to the Colonial Office, and it is requested that merchants interested should be allowed to see and comment upon any plans before a decision is made.

Panama Canal.—In order to correct a typographical error in the Executive Order, dated August 27, 1917, entitled "Establishing Defensive Sea Areas for Terminal Ports of the Panama Canal, and Providing Regulations for the Government of Persons and Vessels Within Said Areas," it is officially directed that the word "south" be substituted for the word "north," following the words "thence north 39 deg. west to a point with San José Rock bearing" in the description of the outer limit of the Pacific entrance of the defensive sea areas of the terminal ports of the Panama Canal.

Lübeck.—Ever since the beginning of the war, active measures have been taken to improve the harbour and increase the industries of the port. A new quay is now to be built in the second outer harbour, berths are to be provided for vessels from inland water ways, and an industrial harbour is to be commenced which alone will cost £147,000. Lübeck is situated favourably for large industrial undertakings ; the State owns most of the land on the waterway from Lübeck to Travemunde and leases it under favourable terms. Three large yards are established near the Herrenbrücke. About £318,000 has been spent since the beginning of the war on improving and extending the harbour and in attracting new industries. Large sums are now to be spent in extending the railway facilities in the harbour district, and in eliminating congestion and delay.

QUESTIONS IN PARLIAMENT.

Mercantile Tonnage.

Mr. H. Samuel, on February 5, asked the Parliamentary Secretary to the Shipping Controller what was the amount of mercantile tonnage built in the United Kingdom in each of the years 1913, 1914, 1915, 1916 and 1917.

Sir L. C. Money : I am sending the information to my hon. Friend privately.

Non-Combatants and U-Boats.

In answer to Colonel Sanders, who asked, on February 5, how many British non-combatants, including men, women and children and merchant seamen, had been done to death by German U-boats and aircraft, Mr. Bonar Law (Chancellor of the Exchequer) said : In round figures, 14,120 men, women and children. No official reports are published by Germany regarding casualties to non-combatants as a result of enemy action.

Loss of the "Aragon."

In answer to Commander Bellairs, who, on February 5, asked a question with regard to the recent torpedoing of a troopship at Alexandria, Dr. Macnamara (Secretary to the Admiralty) said that the hon. gentleman was presumably referring to the loss of the *Aragon*. An inquiry had been made in the usual way, but the report had not yet reached the Admiralty from the Commander-in-Chief.

Commander Bellairs : Could not the right. hon. gentleman after this interval inform us at what time the vessel arrived off the port and at what time she was torpedoed, because this is not the first case of vessels being kept waiting outside Alexandria, which is a non-tidal port, and there is no excuse ?

Dr. Macnamara : The hon. gentleman knows that in the usual course when one of His Majesty's ships is lost a full inquiry is held by naval officers. A report will be sent to the Admiralty, and then I shall be in a position to answer questions.

Commander Bellairs : Will the right hon. gentleman undertake to give answers to those questions, because there are a great many people who are very anxious to put a stop to this practice of ships being kept waiting outside harbours ?

Dr. Macnamara : I am sure it will be the wish of the First Lord to give all possible information on the subject.

Insurance Fund of Liverpool Pilots.

Mr. Houston, on February 6, asked the Parliamentary Secretary to the Board of Trade whether he was aware that the Liverpool pilots, by their own efforts and subscriptions over many years, had created an insurance and benevolent fund ; whether he was aware that, owing to the loss of twenty-eight lives at one time by reason of the sinking by enemy action of the steamer which they were compelled to use as a pilot boat, although she was carrying out the duties of examination and patrol boat, this fund had been depleted ; and whether, in view of the national service which the Liverpool pilots had fearlessly performed during the period of the war, steps would be taken to replenish this fund from public moneys, seeing that it would not represent a greater sum than £4,000 ?

Mr. Wardle : In the case of pilots who lose their lives through enemy action while on duty, compensation is paid to the dependants under the Government scheme. The pilot boat *Alfred H. Read* was recently sunk by enemy action, and the Liverpool and London War Risks Association inform me that they have so far awarded, under the Government scheme, widows' pensions amounting to £1,214 per annum, and children's allowances amounting to £204 per annum. The capital value of these pensions is at least £17,000. I will consider the further question of assisting the local funds.

Protection of Routes in Irish Sea.

In reply to Mr. Lough, who, on February 6, asked whether, having regard to the determined attacks being made by German submarines on the cross-Channel traffic with Ireland, the Admiralty would consider the desirability of establishing protected routes, Dr. Macnamara said : The safety of the cross-Channel traffic with Ireland is always receiving close attention, and the forces at our disposal are distributed so as to give the maximum of safety to merchant shipping as a whole.

Mr. Lough : Is my right hon. friend personally aware of the serious loss that has taken place in the last three or four months, and will he consult the Chief Secretary for Ireland as to the taking of some steps to reduce it ?

Dr. Macnamara : I am personally aware of that. We have discussed the whole situation very fully with the departmental officers.

I have also discussed the matter with the Chief Secretary. Taking the total voyages, the immunity is at least as great as on any other route.

Mr. Field: Is it not a fact that the Admiralty have taken all the precautions they can in order to safeguard this traffic between England and Ireland?

Dr. Macnamara: Yes, Sir. I am very much obliged to my hon. friend for putting it in that way. It is a fact.

Irish Cross-Channel Losses.

Mr. Houston, on February 6, asked the Secretary to the Admiralty whether he could consistently with the public safety, state how many cross-Channel vessels from Ireland to this country, and *vice-versâ*, had been sunk by enemy action during the past three months?

Dr. Macnamara: It is impossible to answer this question without affording the enemy valuable information. We are, however, able to say that the percentage of losses to the number of voyages is extremely small.

Mr. Houston: In view of that answer, is the right hon. gentleman not aware that even as late as Monday last a very large steamer was sunk?

Dr. Macnamara: I cannot say.

Mr. Houston asked whether a steamer crossing from Ireland to Liverpool was sunk by enemy action on or about December 27 in the neighbourhood of Liverpool Bay, and whether twenty-five lives and 400 head of cattle were lost on this occasion?

Dr. Macnamara: When this vessel was lost she was carrying a crew of twenty-four and one passenger. So far as known, the master of the vessel is the only survivor. I understand that the vessel was carrying 400 head of cattle and 206 sheep.

Mr. Houston asked whether a steamer crossing from Ireland was sunk by enemy action on or about January 26 in Liverpool Bay; and whether twelve lives, 156 head of cattle, 361 sheep, and 139 pigs were lost on this occasion?

Dr. Macnamara: The Admiralty deeply regret the loss of life incurred by the sinking of the vessel. I am advised that the details of cargo are as stated in the question.

Passenger Steamer Sunk.

Mr. Houston, on February 6, asked the Secretary to the Admiralty whether he could make any statement in connection with the recent sinking in the English Channel by enemy action of a passenger steamer bound to a French port, with consequent loss of life.

Dr. Macnamara: I am advised that no useful purpose would be served in making a statement. But I will endeavour to get any information required by my hon. Friend, to be given to him confidentially, if he will communicate with me. I regret to say that 14 of the crew of 20, and 18 out of 25 naval and military passengers were lost.

SUPPLIES OF FOOD FOR COASTWISE SEAMEN.

On behalf of the Shipping Controller, Sir Leo Chiozza Money, M.P., received a deputation, representing shipowners and seamen, to consider arrangements for ensuring that the latter could obtain supplies of food required for the voyage without the delays which had occurred in the past.

Representatives of the Ministry of Food and of the Board of Trade were also present.

It was generally agreed that the best system would be found in an arrangement under which each seaman would be provided with a Rationing Card, by means of which he could obtain necessary supplies, and that the dealers from whom such ships' supplies had customarily been obtained in the past should supply seamen only, and should be guaranteed the necessary stocks by the Food Controller, so far as national supplies might permit.

It was decided to set up a Sub-Committee, representing the shipowners, the seamen and the Ministry of Food, to work out the details of the system, and to make provision for dealing with all the small difficulties that arise in connection with the provision of food for men in coasting and other weekly steamers. The following are the names of those nominated for the purpose:—Mr. R. Mason, Mr. Cuthbert Laws, Mr. T. G. Jones, and Father Hopkins.

The representatives constituting the District Boards of the National Maritime Board will, when necessary, consult with the Local Food Committees, and [illegible] to the [illegible] who shall in future supply seamen.

NEWS PARAGRAPHS.

Shipbuilding in British Columbia.—Contracts have been given out for 40 additional wooden vessels, to be built in British Columbia—20 of them at Victoria, and 20 at Vancouver.

The Nippon Yusen Kabushiki Kaisha.—According to a Reuter message from Tokio, the Nippon Yusen Kabushiki Kaisha has decided to re-open its service via the Mediterranean early in March with three ships.

The Moor Line Ships.—At an extraordinary general meeting of the Moor Line, Ltd., at Newcastle, on February 12, it was decided that in the event of the Company's fleet being sold, the directors should be authorised to pay Walter Runciman & Co., Ltd., reasonable compensation for loss of employment as agents of the Moor Line, Ltd.

British Chamber of Commerce at Harbin.—The British Consul at Harbin calls attention to the British Chamber of Commerce at that place. The Chamber was formed last May, and has for its objects the promotion and protection of British trade interests by ensuring the co-operation of those interests in Northern Manchuria. The hon. secretary is Mr. A. E. Smith, British Chamber of Commerce, Harbin.

New Steamship Service.—According to a notice published in the *Melbourne Age*, the Dutch line of steamers operated by the Royal Packet Company propose inaugurating this month (February) a fortnightly service between San Francisco and Australia. The itinerary will be San Francisco-Sydney-Melbourne-Adelaide, returning to San Francisco via Java. It is stated that the steamers to be employed will be of large tonnage.

Increased Wages for Lightermen.—The Association of Master Lightermen and Barge Owners state that the Committee on Production have adjudicated on further demands put forward by the employees for an advance in wages, and have awarded substantial increases for both day and night work and overtime. These advances, the Association states, render it imperative that master lightermen, in common with the Port of London Authority, the wharfingers, and others, should increase their present lighterage charges by at least 20 per cent.

Economic Combine of Austrian Shipping Companies.—According to *Die Zeit* negotiations for the creation of an economic combine of shipping companies in Austria have been completed. The combine will not be a commercial but an administrative body, which will assist all the companies, when trade is resumed, in the first place to obtain the necessary materials through common action. The combine will collect evidence about existing tonnage, exercise decisive influence on the distribution of tonnage, and advsie the Government on the measures to be taken. Whether a commercial combine of shipping companies will also be established, as in the case of other war economic combines, is not yet decided.

Twenty-fold Appreciation of Capital.—The Norwegian firm of Kloster was founded in April, 1915, with a share capital of £55,000 in 2,500 kr. (£138) shares. Owing to the great appreciation in value of the shares it became necessary, for convenience, to divide each into five parts, nominally of 500 kr., but actually quoted at 7,500 to 8,000 kr., says *Verdens Gang*, when the company was wound up last spring. As a result of the liquidation, 10,000 kr. was paid out on each share, representing 2,020 per cent. profit in two years. During its brief but sensational career, the company paid 60 per cent. in dividends, so that an original shareholder who held on to the end should have been very well satisfied with his investment.

Contract for Ship Charters.—A new regulation inserted in the Defence of the Realm Regulations provides that there shall be included in every contract for the charter of any British ship registered in the United Kingdom, and in every contract made in the United Kingdom for the charter of any ship not being such a British ship, a provision making the validity of the contract conditional on the approval of the Shipping Controller being given to it. A copy of the contract is to be delivered to the Shipping Controller within 14 days of its date. When, however, the contract is not made in the United Kingdom, the period is 14 days after the date on which a copy of the contract, if posted immediately at the place where it is made, would in due course reach the United Kingdom. The Shipping Controller has issued an [illegible] dated before February 5 which do not [illegible].

Stettin Oderwerke A.G. fur Schiffbau, &c.—It has been decided to raise the capital to £196,000 by the issue of £68,500 in 1,400 shares ranking for half dividend on the year 1917-18.

Finland's Flag.—A meeting of the Union of Captains at Helsingfors decided upon a yellow cross on a red ground with nine white stars in the upper left field as the "new flag of independent Finland."

Trafik Aktiebolag Grangesburg Oxelosund.—This company is issuing £2,200,000 in 5½ per cent. debentures in order to pay for 18 steamships (total 115,000 tons d.w. capacity) ordered from the Gotawerke.

Norwegian Freight Receipts.—For the year 1916 these amounted to £108,000,000, compared with £26,100,000 in 1915, and £11,650,000 in 1914. The 1916 total is made up by £53,300,000 from steam shipping and £54,700,000 from sailing vessels.

Dutch Coal Requirements.—The coal production of Holland amounted to 2,656,000 tons in 1916, compared with 2,333,000 tons in 1915. Since the imports amount to about 6,000,000 tons per annum the annual consumption is slightly over 8,500,000 tons.

Mannheim Dampfschiffahrts Gesell.—This company is selling all its vessels and shipping equipment to the Rhein u. Seeschiffahrt Gesell. for £101,500. Shareholders in the Mannheim company may either exchange share for share in the R. u. S. company or they may sell out at 110 per cent.

Rodby Havns Skibsvaerft.—This company (share capital £110,000) has started work with four building slipways for 4,000-ton vessels and one repair berth for 5,000-ton vessels. Frames for one small motor boat are already erected and work is commencing on six 2,100-ton motor schooners for Rasmussen (Copenhagen).

Hollandsche Vrachtvaart Mij.—This new firm of owners has a capital of £333,333 (£208,333 paid up) and 16 vessels of 7,600 tons d.w. capacity at its disposal. Work will be commenced with one 450-ton steamship and four 230-ton cutters. Five more vessels (1,900 tons) should be available almost at once, and the remainder during 1918.

Schiffswerfte u. Maschinenfabrik (Janssen Schmilinsky) A.G.—The forthcoming general meeting will consider a scheme for the removal and enlargement of the shipyard. A fresh lease would be substituted for the present one with the State of Hamburg. The agenda includes also a proposal to raise the capital from £14,700 to £147,000 by the issue of 2,700 fully-paid bearer shares.

Germany and Herring Fisheries.—*Hansa* points out that the value of herrings caught in the North Sea prior to the war was about £9,800,000 per annum, but that the value of the German catch for 1913 was only £640,000 (no less than £4,050,000 worth being imported). "Comparison of these figures shows how necessary it is to enlarge the German herring fleet, and how welcome is the war committee (of the eleven associated fishing companies) whose problem it is to make us independent of foreign fishers."

Dampfschiffahrts Gesell. Argo, Bremen.—The proposed capital increase from £116,000 to £510,000 has been accepted. The fresh shares will be offered to existing shareholders in the ratio of 1 : 4 and at 145 per cent.; the money will be applied principally to the provision of new vessels needed to restore the company's fleet to its pre-war strength. A balance sheet and dividend are promised at an early date; the last dividend paid was 12 per cent. for 1913. Since then the company has been exempted from publishing accounts.

Austro-German Yard in Dalmatia.—According to the new Austro-Hungarian shipping journal, the *Schiffahrts Zeitung*, an Austro-German syndicate, is occupied with the foundation of a shipyard at Spalato. Prof. Oswald Flamm (Berlin) has been entrusted with the revision of the plans. The Vienna journal expresses the warmest approval of the scheme, "since there is a great lack of productive yards in Austria." The only important ones are the San Rocco and Cantiere Navale yards for merchant vessels and the Austria Werft for war vessels.

British Guiana Trade.—The report of the Governor of British Guiana for 1916 states that the revenue for the year was £669,385. The expenditure was £642,183, and there was a surplus of £26,902. The total value of imports for the year (including transit trade) amounted to £2,471,944, being £503,730 more than the aggregate value of the imports of 1915. The total value of exports for the same period was £3,758,066. This amount includes British and foreign goods re-exported and transhipped during the year, valued at £395,543. The value of the export trade was greater than the previous year's transactions by £421,728, an increase of 12·64 per cent.

Cost of Manufactured Iron.—The returns of the sales of manufactured iron for the two months ended December 31, 1917, in the district covered by the Board of Conciliation and Arbitration for the Manufactured Iron and Steel Trades of the North of England, show that the average net selling price per ton was £13 14s. 5·70d. In accordance with the sliding scale arrangement, the wages for February and March this year will be the same as prevailed in the previous two months.

Shipbuilding in Chinese Treaty Ports.—An Order in Council recently published in the *Gazette* provides that "whereas by treaty, grant, usage, sufferance, and other lawful means, His Majesty the King has jurisdiction in China," no person shall assist in the construction of ships within the limits of the China Order in Council, 1904, without the permission of the Foreign Minister. The Order is to come into force on March 1 next, but does not apply to the completion of a ship which was actually under construction at the date of the Order—February 5. Any person contravening the Order is liable to imprisonment without hard labour, not exceeding six months, and to a fine not exceeding $500 for every day during which such contravention continues.

Trading Facilities on the Medway.—A meeting of representatives of the Maidstone, Chatham, Rochester and Gillingham Corporations was recently held to consider the adoption of a scheme to develop the trading facilities on the Medway. It was explained that with the provision of adequate wharves, it would be possible for ocean-going ships of 7,000 or 8,000 tons burden to unload at Rochester or Chatham, where there is a sufficient depth of water, and that great benefit would accrue to the County of Kent. Later, an official statement will be drawn up on the subject and submitted to another meeting. Should the proposed scheme be adopted, it will be necessary to apply for an Act of Parliament before it can be carried out. The Mayor of Maidstone, reporting to his Corporation on the matter, stated that if the local traders could get their goods from Rochester or Chatham, instead of having to send to the Port of London for them, the ordinary charges would be reduced by one-half.

The National Lifeboat Institution.—Since the middle of last century the National Lifeboat Institution has always been fortunate in having a Duke of Northumberland as its President. The present head of the Percy family is no less enthusiastic for the well-being of this great and humane agency than were his forebears. In the survey of the work of the Institution in the year 1917, just published, his Grace presents some impressive facts which ought to induce increased financial support from the general body of the public. The Institution last year was instrumental in saving 1,348 lives. The total number of lives saved since the outbreak of war is now well over 4,000. Neutral crews figure largely in these rescues, and thus show more than ever the international character of the Institution's work. The national value of the lifeboat service in these days is not limited to the direct saving of life from shipwreck, and at this time when the transport of our food supplies is so vital to the country, it is gratifying to note that since August, 1914, the lifeboats have saved 150 vessels of various kinds.

Diesel Engine Users' Association.—At the first meeting of the Diesel Engine Users' Association since the election of its new president, Mr. Napier Prentice, the hon. secretary reported recent communications with the Controller of Munitions Mineral Oil Production in connection with the subject of fuel oil supplies and the use of tar oil as fuel in Diesel engines. He further reported the appointment by the Controller of a committee to assist him in these matters, especially in connection with applications for licences to use tar oil, and of methods to adapt Diesel engines for the use of tar oil. This committee is to be styled "The Heavy Oil Engine Fuel Committee." It is composed of the nine members of the General Committee of the Diesel Engine Users' Association, to which have been added two further members nominated by the Institution of Electrical Engineers. The hon. secretary of the new committee is Mr. Percy Still, M.I.E.E., and the offices are at 19, Cadogan Gardens, S.W. 3. Mr. John Milton read some notes giving the results of his experience in the use of tar oil as fuel in Willans' Diesel engines without pilot ignition apparatus. These notes, and the discussion which followed, produced a considerable amount of very useful and practical information on a subject which is of particular interest and importance to all users of Diesel engines at the present time.

Rapid Shipbuilding. A wireless message from New York on February 8 stated that three steel ships of 9,000 tons each are now ready in San Francisco. The keels were laid 110, 141, and 146 days ago respectively.

French Merchant Service.—Speaking in the French Senate, M. Bouisson, Commissioner of Maritime Transport for the Merchant Marine, said that while the Government proposed to requisition the entire French merchant service, it had no intention of turning the State into a shipowner.

T. W. Broadbent, Ltd., Huddersfield.—This firm notify that they have appointed as their agent in Scotland Mr. James Espie, 36-38, Smith Street, Kinning Park, Glasgow, who will in future deal with all Scottish inquiries for the sale of their electric generators, motors, switchboards, &c.

French Shipbuilding Society.—Under the patronage of a group of influential French industrial and financial companies, a shipbuilding society, with the name of Les Chantiers Navals Français, has been established in France. The capital of the society, partially open to public subscription, will be 30,000,000 fr. (£1,200,000). The society will specialise in the building of cargo vessels.

Newfoundland Sailing Fleet.—The Newfoundland sailing fleet now numbers 125 vessels and 17 others are on the stocks, the total of 142 making the largest locally owned fleet for a great many years. This is exclusive of vessels used only in the island trade. The fleet, made up of schooners ranging from 100 to 400 tons, has a capacity which will enable the colony to take to foreign markets in Newfoundland vessels the entire catch of cod in island waters.

Scandinavian Shipping Losses.—It is reported from Copenhagen that at the beginning of 1918 the Norwegian merchant fleet consisted of 1,669 ships, of a total tonnage of 1,996,000. During 1917 there were 367 ships sunk, representing a tonnage of 566,000. At present there are 127 steamers, with a total tonnage of 91,000, being built in Norwegian shipyards. Since the beginning of the war, 215 Danish ships have been sunk, representing 223,912 tons.

A Special U-Boat Department.—The *Marine Verordnungsblatt* publishes an Imperial (German) decree providing for a new department in the Admiralty, the U-Boots-Amt, to deal specifically with such matters appertaining to the construction and inspection of submarines as have been dealt with hitherto by the construction department of the Admiralty. It is at present intended that the U-boat department should be a temporary organisation for the duration of the war.

Turkish Shipbuilding.—There is a great shortage in the tonnage available to meet the needs of coastal traffic in Turkey. In order to encourage the construction of wooden vessels, the Government has offered the privilege of taking timber gratis from the State woods. Since the announcement of this offer, 150 plans have been received for the construction of vessels of less than 500 tons d.w. capacity. *Hansa* suggests that this opens out a profitable field for German motors as auxiliaries on sailing vessels.

Allied Control of Atlantic Shipping.—A Reuter message from Washington states that the Shipping Board has announced that the Allies have accepted the plan to turn over the direction of all Transatlantic tonnage to the Control Committee recently appointed, and comprising Mr. P. A. S. Franklin, Mr. H. H. Raymond, and Sir Connop Guthrie, the representative of the Director of British Transports in the United States. Mr. Hurley, chairman of the Shipping Board, said that if maximum efficiency can be obtained from every ship available it will be equivalent to the addition of a considerable amount of new tonnage.

Mercantile Steamship Company, Ltd.—The absorption of the Mercantile Shipping Company has been approved by over 85 per cent. of the shareholders, and will therefore take place. The directors say that more than the necessary 85 per cent. of the holders of shares of the Mercantile Shipping Company, ordinary and preference, have already accepted the offer made, which expired on February 8, and the directors' proposal will, therefore, be carried out. In addition to the vessels, the company have assets totalling £892,000 in cash. £32 was offered for each £5 ordinary share and par for each £1 5 per cent. non-cumulative preference share.

Scandinavian-American Line.—The general passenger agency of the Scandinavian-American Line, heretofore in the hands of A. E. Johnson & Co., Inc., with offices at No. 1, Broadway, New York, Chicago and Minneapolis, has been taken over by the Line, and Mr. Halvor Jacobson has been appointed general manager, with headquarters in New York. The firm of A. E. Johnson & Co., Inc., will be dissolved and its assets and liabilities transferred to the new management. The transfer includes the sub-agencies at Boston, San Francisco and Seattle. With this transfer, says *Shipping* (New York), all important steamship lines are now conducting their American passenger business in their own offices and the agency system has come to an end.

Largest Norwegian and Swedish Constructions.—The largest vessel yet built in Norway is the Diesel ship *Borgland* (6,500 tons d.w. capacity), built by the Akers mek. Verksted for Fred Olsen & Co. This vessel measures 376 ft. (362 ft.) × 51¼ ft. × 25½ ft., and has main motors of 2,200 h.p. The *Bullaren* Diesel motor-ship, built by the Göta works for the Trans-Atlantic Company, is considerably larger and more powerful, and is the largest vessel yet built in Sweden. The principal dimensions are 440 ft. (425 ft.) × 56 ft. × 38 ft. to shelter deck. The dead-weight capacity at 26 ft. draught is 9,100 tons and there are two six cylinder, four-stroke Diesel motors, each of 2,000 i.h.p., designed to give a speed of 13 knots fully laden. Two sister vessels of the *Bullaren* are under construction for the same owners.

Notice to British Seamen.—The Marine Department of the Board of Trade makes the following appeal for economising food:—"In view of the shortage of foodstuffs all persons in the United Kingdom are being urged to exercise the strictest economy in food. You are facing danger and hardship in order to bring foodstuffs to this country. Has it ever occurred to you that there is another way in which you can help your country, that is, by exercising economy in food on board ship? Your usual allowance of provisions has not been reduced, but it may be more than you actually require. If so, ask for less. Any saving in food on board ship means more food left for those at home. There is another way in which you can help your country, that is, by preventing waste. If any food is left over after a meal, don't throw it away; send it back to the galley, where the cook may be able to use it in making up fresh dishes. Remember that all food saved is saved not only for the ship, but for the country."

French State Control of Shipping.—A Reuter message from Paris states that M. Lemery, Under-Secretary of State for the Merchant Marine, writing in the *Journal*, declares that the decree signed in January, placing all French merchant ships under the direct order of the State, only rendered obligatory an arrangement which was already in existence. Up to the present, M. Lemery writes, no transport has been permitted except under licence. Henceforward we shall order automatically the transport of such materials as are necessary for supplying the country. Moreover, our British and American Allies, who were led to take such a measure, have asked us to adopt a similar course. The measure will enable us to employ a certain number of vessels which the shipowners have kept too long under repair. The requisition will have three objects: To fix the cargo of each vessel, to determine shorter and more rapid routes, and to establish a standard of freights in order to avoid speculation. Henceforth programmes of the needs of the various State Administrations will be drawn up. These programmes will be compared with those of the other Entente Powers, and the tonnage will be accordingly assigned.

Captain Davidson Memorial.—An interesting function took place last week at the Sirocco Engineering Works, Belfast, when a tablet in memory of the late Captain J. S. Davidson, director and general manager of Davidson & Co., Ltd., was unveiled in presence of the workers. Captain Davidson was the only surviving son of Mr. S. C. Davidson, founder and managing director of the Sirocco Works, and was killed in action on July 1, 1916, at Thiepval. From the memorial fund, which now amounts to about £550, the final allocation has been made as follows:—A donation of £200 to the Ulster Women and Children's Hospital, Templemore Avenue, to name two cots the "Captain J. S. Davidson Cots"; a donation of £100 to the U.V.F. Hospital for the equipment of a gymnasium in connection with the orthopædic branch; and the founding of an engineering scholarship at the Belfast Technical Institute, to be known as the "Captain J. S. Davidson Memorial Exhibition," under which a gold medal will be awarded annually, with a cash prize, the total value of the Exhibition each year being £10, and applying in particular to the third-year course in mechanical engineering. The balance has been devoted to providing the memorial tablet above referred to.

Casablanca a Coaling Station. The Acting British Consul at Casablanca reports that it is proposed to make Casablanca, in the French zone of Morocco, a coaling station for the West African and South American liners, in competition with Teneriffe.

Bruckenbau Flender A.G.—This firm is preparing to establish a large yard on the Trave at Lübeck. A site has been purchased from the State of Lübeck on the right bank of the Trave and the community has voted £6,000 in support of the settlement.

Ship Mortgage Bank for Berlin.—Following the establishment of a ship mortgage bank in Hamburg, it is now proposed to found a similar institution in Berlin. The Dresden Bank, the National-bank fur Deutschland, and the Preussischen Hypothekenbank are the principal members of the syndicate formed to deal with the new scheme.

Shipbuilding Company, Constantinople.—*Hansa* reports the establishment of this concern with a capital of 100,000£ (Turkish). Extensive equipment is to be provided for the construction of wooden and steel vessels. At present there is difficulty in securing steel for shipbuilding, hence work will be commenced on wooden vessels. It is proposed to erect a floating dock.

State Ownership in Denmark.—The Danish Ministry of Commerce has ordered ten vessels from Burmeister & Wain. These vessels will be used in Government service. Each will be of 2,500 tons and all will be completed within 18 months, provided that the Government secures the necessary material. This order is tantamount to State support of the yard's extension schemes.

Shipbuilding in Spain.—Plans are well in hand for the new shipbuilding and engineering works to be established at Valencia, in Spain, by the Compania Trasmediterranea. An area of between 14 and 15 acres has been acquired for the purpose. Four slips capable of allowing the construction of vessels up to 10,000 tons displacement are to be provided. The new yard is to include shops for the construction of marine-type internal-combustion engines.

German Shipping Profits.—A correspondent of *The Economist* states that an example of the war profits in the German shipping industry is given by a recent auction at Rostock, when a steamer, built in 1908, with a carrying capacity of 2,600 tons, was sold for £127,500, its original price being £24,500. Up to 1911 no dividends were earned on the vessel. In 1912 she earned 12 per cent., in 1913 14 per cent., in 1914 nothing, in 1915 5 per cent., and in 1916 60 per cent. !

Marine Risks on Cargo.—In view of the inability to obtain in the Insurance market the full amount of insurance required in the case of cargoes of great value, the Board of Trade have authorised the War Risks Insurance Office at 53, Cornhill, London, E.C. 3, to grant Marine Insurance on any portion of such value which cannot be placed on the open market. This facility is in no way intended to compete with the open market for Marine Risks, and will only be available when the shipper has exhausted the facilities of the market.

Rotterdam Shipping.—In a report on the commerce and industries of the Netherlands during 1916, the Consul-General at Rotterdam (Mr. S. Listoe) states that at the close of 1915 the shipping of the port of Rotterdam was about one-third of the amount during the last year before the war. During 1916 a further decrease of 25 per cent. was recorded. The number of ships entering and leaving the port decreased from 3,760 to 3,152, showing a decrease of tonnage from 4,224,805 to 3,237,566 tons. The decrease of shipping affected the finances of the municipality, the harbour dues in 1916 amounting to only 291,686 dols., as compared with 923,439 dols. in 1913, and 367,225 dols. in 1915.

Shipping Control in America. A Reuter message from Washington states that the Shipping Board announces the appointment of a Committee with supreme authority over American, Allied and Neutral shipping out of American ports. This arrangement creates a pool of ships for moving supplies to Europe. Goods destined for overseas will be loaded on available ships, whether American or Allied. With the aid of the Railroad Administration the Shipping Board will divert to Southern ports much of the supplies which have hitherto been clogging the port of New York and incoming vessels will be directed by wireless to proceed to ports where materials of the most importance are awaiting shipment. On the Committee are Mr. P. A. S. Franklin (chairman), Mr. H. H. Raymond and Sir Connop Guthrie (representative of the British Director of Transports in the United States).

WORK IN THE DANZIG YARDS.

There is great and sustained activity in Danzig yards, says *N.A.Z.*, under great difficulties caused by the shortage of labour. The Schichau Werft is making slow progress with the Lloyd ss. *Hindenburg*, for which it is difficult to obtain materials. Damage inflicted on the bow of the ship's frame by fire, a long time ago, has not yet been repaired; this damage was estimated at £49,000. The Lloyd liner *Columbus*, launched from the Schichau yard in 1913, and due to have commenced American service a year later, is still lying at Danzig. Both the hull and the equipment of this vessel have appreciated enormously in value during the war, and the vessel is ready for service directly peace is declared. Four Turkish passenger vessels, built by J. W. Klawitter during 1913-14, also await the return of peace. These vessels were ordered by the Turkish Government for use on the Bosphorus. The Klawitter yard has at present several smaller vessels under construction. J. Wojan's yard on the Weichsel undertook only repairs on barges, lighters, &c., before the war, but it has since been greatly extended and now builds small steamships in addition to shipping for inland service. A large concern has been established on the Holm for the construction of floating docks for large shipyards.

SHIPBUILDING PROGRESS AT SAVANNAH.

Shipbuilding was not known at Savannah until 1916, but there is now great promise of its becoming quite a busy centre for ship construction. At the present time there are three large plants in operation, from which three vessels have already been launched, while no less than 30 vessels are on order. Two of the vessels launched are schooners, one of 2,000 tons and the other 1,350 tons deadweight; while the third is an auxiliary schooner of 2,000 tons deadweight. Two vessels are almost due for launching.

Three companies have established yards at Savannah—the Savannah Engineering & Construction Company, the Georgia Shipbuilding Company, and the Terry Shipbuilding Corporation. The last named has contracts in hand for 20 composite steel and wood ships valued at £100,000 each, and employs about 1,000 men.

The Savannah Engineering & Construction Company and the Georgia Shipbuilding Company are smaller concerns.

A fourth shipbuilding company in Savannah, which has not yet actually started work, is the National Shipbuilding & Dry Dock Company, possessing a shipyard with 8,000 ft. frontage on the Savannah River.

In addition to the shipyards referred to above, the Savannah Board of Trade has been in correspondence with several other shipbuilding companies which, in the near future, intend to start operations in Savannah.

SHIPBUILDING SCHEME AT CALCUTTA.

According to the *Pioneer Mail* (India), an announcement recently made has been confirmed regarding the institution of a shipbuilding branch of the Indian Munitions Board in Calcutta. An official of the Admiralty Construction Branch is to enquire into the prospects of shipbuilding in Calcutta and other Indian ports, and to discover how the labour problem stands in India and what the needs are as regards materials.

Local shipbuilders are enthusiastic about the scheme and are making arrangements to provide full information for the Admiralty's representative. They say that the great handicap is that of getting shipments of materials needed for construction. The harbour question is satisfactory, and it is believed that a start will be made in the existing shipyards here with a number of small craft, and that as development goes on bigger constructions will follow. Ever since May last the shipbuilders declare they have been impressing upon the authorities the necessity for shipments.

The main difficulty that exists at present in constructing steel-built vessels is the famine of steel plates in India. There is no business concern in India that possesses adequate machinery for the rolling of large steel plates for shipbuilding. It is therefore presumed in shipping quarters at Calcutta that the early energies of the Construction Branch in India will be almost solely devoted to the making of barges and small craft for the campaign in Mesopotamia and for turning out wooden coasting ships to replace some of the steel vessels in that trade.

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"SHIPBUILDING AND SHIPPING RECORD" TABLE OF SHIP SALES.

Name and Type.	Tonnage.	Dimensions. Draught in ( ).	Sold by, to	Builders, hull and year.	Machinery and builders.	Remarks.
Armonia, ss. (*ex Santiago, ex Weimar*)	5,226 gr. 3,302 net 6,300 d.w.	415½′ × 48½′ × 29½′ (25′ 8″)	R. Lawrence Smith, Ltd., Montreal, to buyers not stated	Fairfield Co., Ltd., Glasgow (1891)	31½, 52, 83½ × 54 (Fairfield Co., Ltd.)	—
Bathampton, ss. (single dk.) (*ex Withernsea*)	3,282 gr. 2,063 net 6,250 d.w.	352′ × 49½′ × 22′ (21′ 4″)	Bathampton S. Nav. Co., Cardiff, to buyers not stated	Earle's S. & E. Co., Hull (1912)	24, 39, 66 × 45 (Earle's S. & E. Co.)	Price about £117,500. Sold in March, 1916, for about £115,000.
Beverley, ss. (*ex Baltimore*)	1,414 gr. 1,013 net	222½′ × 35½′ × 22½′	Colonial Navigation Co., New York, to buyers not stated	W. E. Woodall & Co., Baltimore (1885)	30, 57 × 36 (C. Reeder & Sons, Baltimore)	—
Edith, ss. (single dk.)	1,639 gr. 975 net	257½′ × 35½′ × 18½′ (19′ 5″)	Mr. N. P. Swensson, Helsingborg, to buyers not stated	W. Gray & Co., W. Hartlepool (1882)	29½, 60 × 39 (Blair & Co., Stockton)	Price about £77,500.
Ernaston, ss. (pt. awning dk.) (*ex White Cross*)	3,020 gr. 1,944 net 4,650 d.w.	322′ × 44½′ × 21½′ (23′ 5″)	Ernaston S.S. Co., Glasgow, to J. Crass & Co., Newcastle	J. L. Thompson & Sons, Sunderland (1891)	21½, 39, 64 × 42 (John Dickinson, Sunderland)	Price about £47,000.
Gabo, ss. (single dk.)	2,060 gr. 1,246 net 2,300 d.w.	279½′ × 38½′ × 20′ (21′)	The Australian Steamships, Ltd., Melbourne, to buyers not stated	J. Key & Sons, Kinghorn (1883)	36, 70 × 48 (J. Key & Sons)	Price about £35,000.
Helikon, ss. ..	2,170 gr. 1,390 net 3,000 d.w.	270′ × 40′ × 21½′	Brunsgaard, Kjosterud & Co., Drammen, to buyers not stated	Hong Kong & Whampoa Dock Co., Hong Kong (1917)	20, 33, 54 × 39 (Hong Kong & Whampoa Dock Co.)	—
Oaxaca, ss. (spar dk.) (*ex Primula*)	1,393 gr. 860 net 2,000 d.w.	231½′ × 35½′ × 20½′	Cie Mexicana de Nav. S.A., Tabasco, to buyers not stated	Framnes Mek. Værks., Sandefjord (1903)	16½, 27, 44 × 33 (Akers Mek. Værks, Christiania)	Price about £125,000.
Polar Prince, ss. (spar dk.) (*ex Kawak, ex Oberon, ex Persia, ex Ingeborg, ex Goldenfels*)	3,611 gr. 2,288 net	340′ × 44′ × 19′ (24′ 8″)	Prince Line, Ltd. (Furness, Withy & Co.), Liverpool, to Farrar, Groves & Co., London	Wigham, Richardson & Co., Newcastle (1895)	22, 28, 44, 64 × 44½ (Wigham, Richardson & Co.)	—
Saima, ss. (single dk.)	1,147 gr. 679 net	228½′ × 35½′ × 15½′	Dampskibs. Akties. "Saima," Bergen, to Witherington & Everett, Newcastle	Laxevaags, Maskin & Jernskibsbyggeri, Bergen (1914)	16½, 27, 44 × 30 (Laxevaags, Maskin & Jernskibsbyggeri)	—

FORTHCOMING EVENTS.

LIVERPOOL ENGINEERING SOCIETY.—Wednesday, February 20, meeting at Royal Institution, Colquitt Street, Liverpool. Professor W. H. Watkinson, M.Eng. (Liverpool), M.Inst.C.E., M.I. Mech. E., M.I.E.E., on "Our Fuel Sources and Possible Improvement in their Utilisation."

INSTITUTION OF ELECTRICAL ENGINEERS.—Thursday, February 21, meeting at the Institution of Civil Engineers, Great George Street, Westminster, London, S.W., at 6 p.m. Paper by Dr. C. C. Garrard on "Switchgear Standardisation."

INSTITUTION OF CIVIL ENGINEERS.—Tuesday, February 19, meeting at Great George Street, Westminster, S.W., at 5.30 p.m. Further discussion on paper, "The West Quay of Madras Harbour," by the Hon. Sir F. J. E. Spring, K.C.I.E., M.A.I., M.Inst.C.E., and Hugh Henry Gordon Mitchell, M.Inst.C.E.

INSTITUTE OF PETROLEUM TECHNOLOGISTS.—Tuesday, February 19, meeting at the Royal Society of Arts, Adelphi, London, W.C., at 8 p.m. Paper on "A New British Oil Industry," by Mr. C. H. Cunningham-Craig, B.A., F.R.S.E., F.G.S., Dr. F. Mollwo Perkin, F.I.C., F.C.S., Mr. A. G. V. Berry, and Dr. A. E. Dunstan, F.C.S.; chairman, Mr. Charles Greenway, President.

SHIPPING AND OTHER MEETINGS.

Feb. 15. (*Fri.*)—**Glasgow Shipowners' Association** (Annual), 150, St. Vincent Square, Glasgow, at 2.15 p.m.

Feb. 20. (*Wed.*)—**Seaham Harbour Dock Company** (Annual Ordinary), Londonderry Office, Seaham Harbour, at 2.15 p.m.

Feb. 26. (*Tues.*)—**Alexandra (Newport & South Wales) Docks and Railway** (Ordinary General), Paddington Station, London, W., at 3 p.m.

Feb. 26. (*Tues.*)—**Penarth Harbour, Dock & Railway Company** (Ordinary General Half-Yearly), 32, Charles Street, Cardiff, at 12 noon.

Feb. 27. (*Wed.*)—**Manchester Ship Canal Company** (Ordinary General), Houldsworth Hall, 90, Deansgate, Manchester, at 11 a.m.

SHIPPING SHARE MARKET.

There has again been considerable activity in the shipping share market, and price-movements give evidence of extensive buying on the part of provincial investors. Conversations with brokers go to show that their clients who are buying shipping shares are mainly from those whose capital is too small to permit of the whole of it being invested in Government war bonds owing to the increased cost of living making it necessary to obtain 6 per cent. or over. The home railway market and the shipping markets are the only ones which offer this return and the latter has captured the fancy of most investors owing to the possibilities of a capital enhancement. There is apparently little speculative buying, most of the bargains being for investment and for locking up for a high rate of interest after the existing rate of gilt-edged stocks has fallen in future years. Where all shares exhibit an advance it is difficult to single out any features. Perhaps the rise in Moor Line shares has been the most sensational. Following the announcement to which we referred last week that the directors had under consideration the sale of the fleet, the shares rose to over 54, at which buyers were still forthcoming. Cunards have also changed hands in very large quantities, the price rising to over 92s. King Lines at over 51s., Clan Lines at 53, Furness Withy at 68s., and Court Lines at 42s., have also been features. Lancashire Shipping shares have fluctuated between 5¼ and 5⅝ on the issue of the accounts and the declaration of a final dividend of 20 per cent., making 30 per cent. for the year. Mercantile steamship shares have not changed materially in price. The recent offer of the Peninsular and Oriental Steamship Company to purchase the shares has been accepted by more than the necessary 85 per cent. and the proposal will, therefore, be carried through. In the shipbuilding section there has also been renewed interest, and there are several indications that the public interest in shipping will extend itself, or to use a market expression, will "boil over" into the shipbuilding companies' shares. The iron and steel section is strong, with a sharp rise in Steel Company of Scotland shares to 15½ on news that the company has sold its interest in the Appleby Iron Company for a substantial sum.

SHIPPING, SHIPBUILDING, ENGINEERING AND MARINE INSURANCE SHARE LIST.

SHIPPING.

Name.	Share and paid.	Extreme quotations, 1917.	Last ann. div. % or per share.	Yield. %	Last Quotation	Rise or Fall.
	£					
African S.S.	20	30½–25½	10	7⅞	28	
Allan Line ... ... Deb.	100	—	4	4⅜	92	
Anchor Line ... Cum. pref.	10	9⅛–8⅞	5⅜	5⅝	9⅛	
Do. ... ... Deb.	Stk.	105⅜–10⅛	4⅜	4⅛	103	
Argentine Nav. ... Cum. pref.	1	25/—14/3	6	5⅛	23/3	+ -/6
Do. ... ... Ord.	1	20/6–6/6	Nil.	Nil.	16/–	– -/3
Australasian Un. S. Nav. Deb.	Stk.	80⅜–79⅜	4	5	81	
Belfast Steam ... ... "A"	10 (5pd.)	—	5	5	5	
British & Argen. Nav. ... Deb.	Stk.	84 –80	4⅜	5⅛	81	
British India Nav. ... Deb.	Stk.	84 –82	4⅜	5⅜	81	
British S.S. Invest. Trust Def.	Stk.	460–344½	50*	11⅜	427	– 3
Do. ... ... Pref.	Stk.	105⅜–104	6	5⅞	102	
Do. ... ... Deb.	Stk.	74½–70	4⅜	6 1/16	72	
Cairn Line ... ... Deb.	Bds.	94 –90	5	5⅜	90⅜–91	
Do. ... ... Ord.	1	51/6–40/9	20†	8	58/–	+ 1/–
Clan Line ... ... Ord.	10	55½–26½	25	5½	54	+ 3⅜
Court Line ... ... Ord.	£1	40/6–29/6	20	9⅜	42/–	+ 1/6
Cunard SS. ... ... Def.	1	95–65/9	20*	5	90/–	+ 1/–
Do. ... Cum. pref.	Stk.	97½–82	5	5⅛	86⅜	+ ⅛
Do. ... ... Deb.	Stk.	100–93½	4⅜	4⅜	97⅜	+ ⅛
Elder Line ... ... Deb.	Stk.	95 –89	4⅜	4⅜	103	
Elder Dempster ... Cum. pref.	1	19/—17/–	5⅜	6⅛	19/6	+ -/1⅜
Do. ... ... Deb.	Stk.	89 –85	5	5⅛	85	
Ellerman Lines ... Pref. Ord.	10	9⅛–8⅜	6⅜	6⅜	9⅜	
Do. ... Guar. pref.	10	9 –8⅜	4⅜	5⅛	8⅜	
France Fenwick ... Cum. pref.	5	95/3–85/–	5⅜	6⅛	87/6	
Furness, Withy ... Ord.	1	60/9–41/6	20*	6⅜	67/–	+ 3/-
Do. ... Cum. pref.	10	9–7⅜	5	5½	8⅛	
General Steam Nav. ... Ord.	1	24/9–21/6	10	7⅜	24/6	+ 1/-
Do. ... ... Pref.	1	19/4⅜–15/-	5	6⅛	15/3	– -/9
Houlder Line ... Cum. pref.	5	82/6–75/–	5⅜	6⅝	78/9	+ 1/3
Do. ... ... Deb.	Stk.	—	4⅜	4⅜	91	
Houlder Bros. ... Cum. pref.	5	—	5⅜	6⅝	4	
Do. ... ... Deb.	Stk.	—	4⅜	5⅜	82	
India Gen. Nav. & Rly. ... Ord.	10	11⅞–8⅞	6	5⅜	11⅛	+ ¼
Indo-China N. ... Pref. Ord.	5	97/6–87/6	6	6⅞	97/6	
Irrawaddy Flotilla	40	—	15	5	120	
Khedivial Mail ... ... Ord.	1	40/—24/–	20	12¾	35/9	
Do. ... Pref.	5	76/3—70/–	5⅜	7⅛	73/9	
Do. ... ... Deb.	Stk.	95⅜–93	4⅜	4⅝	94⅛	– ⅛
King Line ... ... Ord.	1	42/6–31/6	16*	6⅝	52/6	+ 4/6
Lamport & Holt ... Cum. pref.	£1	20/4⅛–18/–	6	6	19/–	
Leyland (F.) ... Cum. pref.	10	8⅞–7⅛	5	5⅞	8⅛	+ 1/3
Mercantile SS. ... ... Ord.	5	30⅛–15	40	8	30⅛	
Do. ... ... Pref.	1	21/—15/9	5	6⅜	21/–	
Moor Line ... ... Ord.	10	35 –20	30	5⅞	55	+ 20
Nelson Steam Nav. ... Deb.	100	—	5	5⅛	98⅜	
New Zealand ... ... Ord.	£10	—	8	2⅝	32½	
Do. ... ... Deb.	Stk.	87⅛–86⅜	4	4⅝	88⅜	
Nitrate Producers SS. ... Ord.	5	25⅜ –20	30	6⅜	24⅜	
Do. ... Cum. pref.	5	100/—90/–	5	5	5	
Oceanic Steam. Nav. ... Deb.	100	98⅜–84	4⅜	4⅜	94xd	
Orient.Stm.Nav.Co. Cum. pref.	10	9⅛–8⅜	5	5⅜	8⅜	
Do. ... ... Deb.	100	92 –88	4⅜	5⅛	88	
P. & O. S. N. ... Cum. pref.	100	93¾–84	5	5⅜	91⅜	+ ¼
Do. ... ... Def.	100	342 –295	18	5⅜	343	
Do. ... ... Deb.	Stk.	65⅛–63⅜	3⅜	5⅛	64	+ ⅛
Prince Line	1	6⅝ –3⅞	30	5⅛	118/–	
R.M.S.P. ... ... Ord.	100	12/—10⅜	7	5⅜	127	+ 2½
Do. ... Pref.	Stk.	85⅜–80	5	6	85	
Do. ... ... Deb.	Stk.	86 –79	4⅜	5⅛	84⅛	
Shaw, Savill & Alb. Cum. pref.	5	87/6 –80	5⅛	5⅞	85/–	
Shell Transport ... ... Ord.	1	6⅛–96/3	35	6⅛	5⅜	
Do. ... Cum. pref.	10	9⅝–9⅛	5	5⅛	9⅛	
Sutherland SS. Co.	£1	75/—50/9	30	5⅛	105/–	+ 25/-
Union-Castle SS. ... Cum. pref.	10	7⅞–7⅛	4⅜	6	7⅛xd	
Do. ... ... Deb.	Stk.	90 –88	4	4⅜	90	
West Hartlepool ... ... Pref.	10	7⅞–7⅛	5⅛	6⅝	8⅛	

INSURANCE.

Alliance	20 (2'4 pd.)	10⅜–9	12/-	7	9⅛	
London Assurance	25 (12½ pd.)	60⅜–48¾	20	6	59⅛	
Merchants' Marine Insurance ..	10 (2½ pd.)	10⅛–6⅞	10	8	10⅝	
N. British & Mercantile Ord.	25 (6¼ pd.)	36—29	40/-	6⅞	34⅜	
Phœnix Assurance	10 (1 pd.)	7⅜–6	40	7	8⅞	
Royal Exchange Assurance ...	Stk.	241½–187	10	4⅛	249⅜	
Sea Insurance	10 (2 pd.)	27½–24¾	10	6	27	
World Marine, Limited ...	5 (2 pd.)	6¾–5⅝/–	5	4⅜	6	

IRON AND STEEL.

Name.	Share and paid.	Extreme quotations, 1917.	Last ann. div. % or per share.	Yield. %	Last Quotation	Rise or Fall.
	£					
Babcock & Wilcox... ... Ord.	1	68/—52/6	15	4⅜	64/–	– -/4½
Baldwins ... Cum. pref.	1	20/—15/–	5⅛	5⅜	20/–	
Do. ... ... Deb.	Stk.	84–82	4⅜	5⅜	84	
Bayliss, Jones ... Cum. pref.	1	—	5	7¼	7	
Bell Bros. ... ... Cum. pref.	10	10 –9⅜	6	6	10	
Do. ... ... Deb.	Stk.	80–73⅜	5	7	74	– 1⅜
Bessemer (Henry) ... Ord.	1	34/6–24/6	12⅜	7⅜	33/6	
Bolckow Vaughan ... Ord.	1	30/—22/2	11	7⅜	29/3	
Do. ... ... Cum. pref.	20	17⅛–16⅜	5	5⅜	16/9	
Cargo Fleet Iron ... ... Ord.	1	24/9–17/3	3	2⅜	26/–	– 1/–
Do. ... ... Deb.	100	84–81⅜	4⅜	5⅜	82	
Consett Iron Co. ... ... Ord.	1	36/3-24/10½	50	11	90/–	
Dominion Iron & Steel	Bds.	88⅜–71⅜	5	7	71	
Dorman, Long ... ... Ord.	1	50/—30/9	8†	—	40/–	+ -/6
Do. ... ... Deb.	Stk.	—	4	5⅜	71	
Ebbw Vale Steel & Iron Ord.	1	30/6—24/6	12⅜	9	28/6	– -/3
Guest, Keen & Nttefids Ord.	1	89/—62/6	15*	3⅜	93/9	+ 8/3
Do. ... ...Cum. pref.	5	5⅝–5	5	4⅜	5⅛	
Do. ... ... Deb.	Stk.	79⅜–73⅜	4	5⅛	77	
Hadfield's Steel Foundry Ord.	1	107/6–78/6	30	5⅜	106/6	
Ibbotson Bros.	5 (4 pd.)	7–6⅛	7⅜	4⅜	6⅛	
Jessop (W.) & Sons ... Ord.	5 (4 pd.)	10–8	15*	6	10⅜	+ ⅛
Lanarkshire Steel Cum. pref.	10	—	5	7⅜	7	
Lysaght (J.) ... ... Cum. pref.	1	25/—20/–	6	6	20/–	
Do. ... ... 2nd pref.	1	19/9—19/4⅜	6	6	20/–	
Manganese Bronze ... Ord.	1	—	6	11	1⅛	
Do. ... ... Cum. pref.	1	—	6	8	1⅛	
North-Eastern Steel ... Deb.	Stk.	—	4⅜	—	—	
Palmers Ship & Iron "A" ...	1	13/—9/9	Nil.	Nil.	13/6	
Scott (Walter) ... ... Ord.	1	29/4⅜–21/3	15	10⅜	29/–	
Do. ... ... Pref.	1	19/9—16/–	6	7⅛	19/9	
Sheffield Forge ... ... Ord.	1	—	15	4⅜	67/–	+ 1/-
Shelton Iron & Steel ... Ord.	1	24/6-16/10½	7⅜	6	22/10½	
Do ... ... Deb.	100	91⅛–91	5	5⅜	91⅛	
S. Durham Steel & Iron Ord.	1	42/9—29/6	10	4⅜	43/–	
Do. ... ... Cum. pref.	1	20/9–18/7½	6	6⅛	20/–	
Do. ... ... Deb.	Stk.	81–80	4⅜	5⅜	78	
Steel Co. of Scotland ... Ord.	10	—	10	10	274/3	
Stewarts & Lloyds Pref. ord.	10	17–16	10	6⅛	16	
Do. ... ... Cum. pref.	10	—	6	4⅜	13⅛	
Stone (J.) ... ... Cum. pref.	10	8⅜–7⅛	5	6⅜	8⅛	+ ⅛
United States Steel ... Ord.	100$	124—109⅛	8	7⅛	100⅛	
Do. ... ... Cum. pref.	100$	—	7	6	114⅛	
Vickers Ltd. ... ... Ord.	1	44/6–35/3	12⅜	5⅜	42/6	+ -/6
Do. ... ... Pref.	Stk.	84–81	3	6	82	
Do. ... ... Deb.	Stk.	79–74⅜	4	5 3/16	76	
Weardale Steel ... Def. ord.	1	32/3 – 23/–	19⅛	13⅜	29/–	+ -/6
Do. ... ... Cum. pref.	1	25/3–18/9	6	5⅛	23/6	– -/6
Do. ... ... Deb.	Stk.	—	4	6½	62	
Workington Iron & Steel Ord.	1	30/3—21/–	10	6⅛	29/–	+ -/3

SHIPBUILDING AND MARINE ENGINEERING.

Armstrong, Whitworth Ord.	1	45/—36/–	12⅜	5⅜	41/9	
Do. ... ... Cum. pref.	5	73/9—67/–	4	5⅛	67/6	
Do. ... ... Deb.	Stk.	78–73	5	6⅜	76xd	
Beardmore (W.)	100	93–89	4⅜	5	90⅛	+ ⅛
Brown (John) ... ... Ord.	1 (18s. pd.)	29–/—22/9	12⅜	7	27/–	+1/6
Do. ... ... Cum. pref.	10	8⅛–7⅞	5	5⅛	8⅛	
Cammell Laird ... ... Ord.	5	7⅛–6⅞	10	7⅛	6⅞	
Do. ... ... Cum. pref.	5	85/6–74/6	5	6⅛	85/–	+1/6
Do. ... ... Deb.	100	83⅛–79⅜	4⅜	5⅜	84	+ 4
Dunlop (Jas.) ... ... Ord.	1	28/8—16/–	10	9⅛	22/9	
Do. ... ... Cum. pref.	1	18/9–16/6	6	7⅛	17/6	
Fairfield Shipbldg Cum. pref.	10	8⅛–8⅛	6	7⅛	8⅛	
Fleming & Ferguson ... Ord.	10	—	10	7	14⅜	
Gray (Wm.) ... ... Deb.	100	100—95⅜	4⅜	4⅜	100⅛	
Hawthorn (R. & W.) Leslie Ord.	10	25⅛–13⅜	12⅜	5	26	+ ⅛
Henderson (D. & W.) Cum. pref.	1	—	5	9	5⅝	
Richardson Westgarth Ord.	1	10/3–5/–	Nil.	Nil.	8/6	+ -/7½
Do. ... ... Cum. pref.	1	19/9—12/6	Nil.	Nil.	17/9	– -/3
Do. ... ... Deb.	Stk.	67–62	4⅜	6⅜	66	
Simons (W.) ... ... Cum. pref.	10	—	5	5	9⅛	
Swan, Hunter & W. R. ... Ord.	1	51/—33/6	12⅜	5⅜	50/–	
Do. ... ... Cum. pref.	1	17/3—17/–	5	5⅜	17/–	
Do. ... ... Deb.	Stk.	78—77	4⅜	5⅜	77	
Thornycroft (John I.) ... Ord.	1	45/—16/–	17⅜	8⅜	39/9	– -/6
Do. ... ... Cum. pref.	1	19/—16/–	6	6⅜	18/6	
Do. ... ... Deb.	100	—	5	5⅜	82	–3
Wallsend Slipway ... Ord.	1	2–1⅛	10	3⅛	65/–	+15/-
Do. ... ... Cum. pref.	1	1—1	5	5	1	

* Including bonus. † Also 20 % in shares. ‡ Treasury price.

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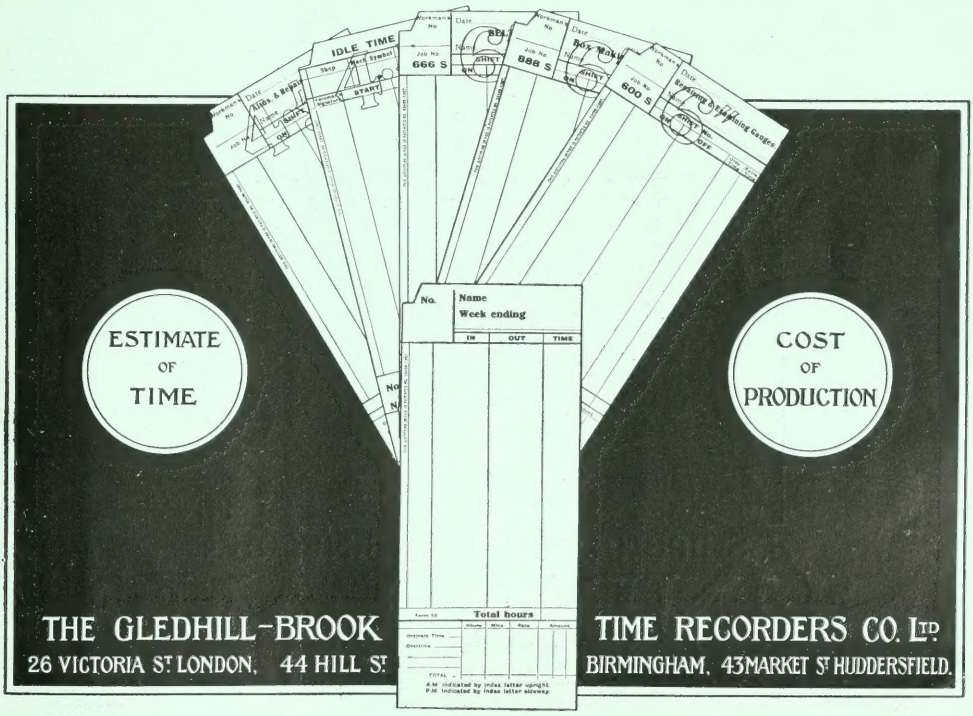
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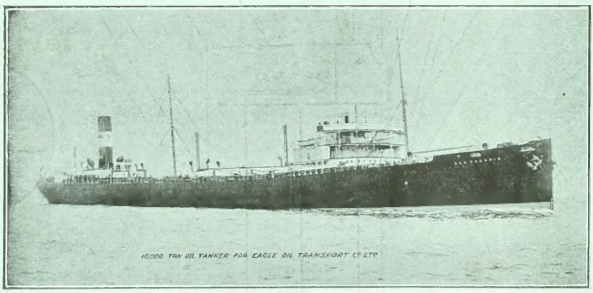

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